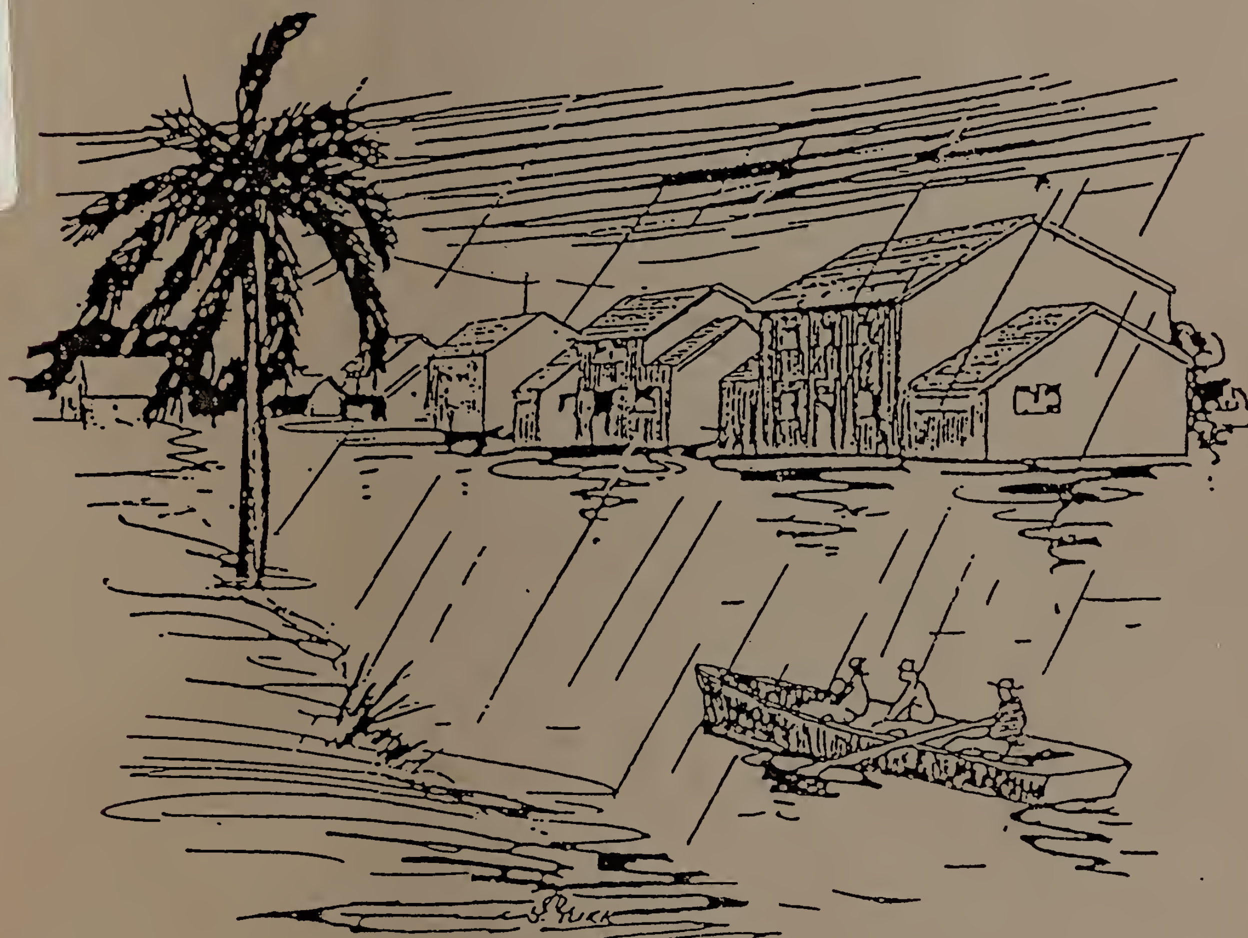
FLOOD PLAIN MANAGEMENT STUDY

LEE COUNTY, FLORIDA

POWELL, DAUGHTREY, POPASH, STROUD, MARSH POINT, CHAPEL BRANCH, BAYSHORE, AND THOMPSON CUTOFF CREEKS AND TRIBUTARIES TO YELLOW FEVER CREEK



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In Cooperation With
The Florida Department of Community Affairs
and
Lee County Soil and Water Conservation District
and
Lee County Commission
1984

6/10/85

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INTRODUCTION

The information presented in this report was developed for use by local decisionmakers and the public in making flood plain management decisions. It is hoped that this information will assist with development decisions in such a way that future intensive rainfalls will result in minimal inconvenience to residents of the area.

Lee County, Florida, is experiencing rapid population growth with accompanying demands for additional land to accommodate this growth. This study area, due to its location near the city of Ft. Myers, can be expected to undergo rapid growth in the near future. This is especially true in the southern and southwest portion of the study area where most properties have already been subdivided into relatively small units, where several subdivisions have been developed in recent years, and where very limited agricultural activity presently exists.

The majority of the study area remains basically rural and is comparatively unaffected by this growth; however, as growth intensifies in the south and southwest portions, the remaining portions of the study area can be expected to have increasing development. Since a large portion of the study area is subject to flooding, pressures to develop such lands can be expected to increase.

This report identifies the major flood-prone areas and will be useful in flood plain management decisions.

Requesting and Participating Entities

The Lee County Commission and the Lee County Soil and Water Conservation District requested a flood plain management study on Powell, Daughtrey, Popash and Stroud Creeks and associated tributaries to assist in identifying local flood problems and making decisions related to land use planning and future development. This study was conducted in accordance with a plan of study developed March 19, 1980, by the Soil Conservation Service (SCS) and requesting state and local authorities.

Lee County employees aided in gathering base data for the study. In addition, the County assumed payment for 50% of a contract for photogrammetric contour mapping.

Study Authorities

The SCS is authorized to provide technical assistance to federal, state, and local governing bodies in the development, revision, and implementation of their flood plain management programs by carrying out flood plain management studies (FPMS's) in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management", and Section 6 of Public Law 83-566. This is in accordance with Recommendation 9(c) of House Document No. 465, 89th Congress, 2nd Session; Executive Order 11988 dated May 24, 1977; and USDA Secretary's Memoranda 1606 and 1607.

In Florida, these studies are authorized under the December 1978 Joint Coordination Agreement between the SCS and the Florida Department of Community Affairs. The Department Secretary is under the direction of the Governor of Florida and is responsible for receiving requests, setting priorities, and coordinating flood plain management studies conducted by the SCS and other state and federal agencies.

Study Objectives

An immediate need exists in the study area to accurately define the existing flood hazard areas so that local governments may plan and carry out an effective flood plain management program. The objective of this flood plain management study is to furnish technical information to the Lee County Board of County Commissioners and the Lee County Soil and Water Conservation District in the form of maps, graphs, and tables depicting various flood discharge and elevation frequency data. This flood plain information is needed as a basis for local flood plain management and land use programs so as to reduce flood losses and enhance the environment of natural flood plain areas.

DESCRIPTION OF STUDY AREA

The study area is a part of the Daughtrey-Trout Creek Watershed characterized by a complex hydrological system. The area is threatened with urban development because of its numerous desirable attributes.

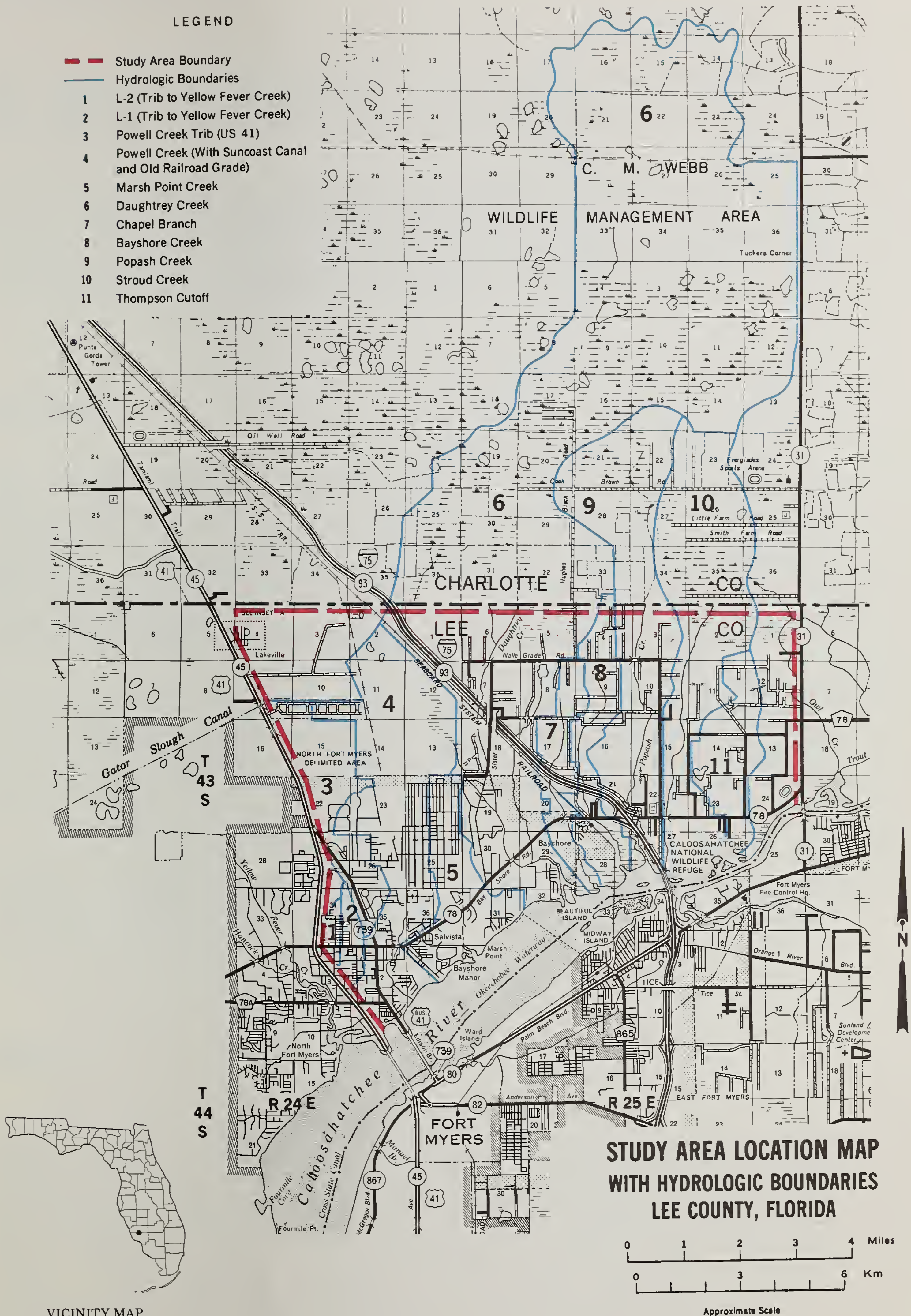
Location

Located on the north side of the Caloosahatchee River, the study area consists of that part of the Daughtrey-Trout Creek Watershed east of U. S. Highway 41 and west of State Road 31 and north to the Lee-Charlotte County line. The area is approximately 50 square miles. Figure 1 shows the study area as well as the stream system.

Stream System

The study area is located within the United States Geological Survey's (USGS's) hydrologic unit number 03090205. The average stream temperature is between 72^{o} and 76^{o}F. The largest fresh water uses are irrigation and municipal water supply. Most of this water is obtained from the upper Floridan Aquifer which has a water hardness in excess of 181 chemical PPM (parts per million).

The study area has 10 tributaries flowing into the north side of the Caloosahatchee River with five having one or more first order tributaries for a total of nine. Approximately 49 miles of tributaries have been analyzed. The hydrologic boundaries of the tributaries and contributing drainage areas are largely indeterminate and subject to change because of the flat topography and swampy conditions. Approximately 67 square miles of headwater area is in Charlotte County to the north of the study area (see Figure 1), making the total drainage area 117 square miles. Part of this headwater area is within the C. M. Webb Wildlife Management Area.



STUDY AREA LOCATION MAP WITH HYDROLOGIC BOUNDARIES LEE COUNTY, FLORIDA

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Figure 1

The Caloosahatchee River is tidal from its mouth in San Carlos Bay to approximately 25 miles upstream, including the study area. At North Fort Myers the tidal range is approximately one foot.

During the rainy season, June through September, the water table usually ranges from 4 feet below ground surface up to or even above the ground surface. During the drier winter months it is from 2 to 6 feet below ground surface. Drainage canals may lower and surface impoundments may raise water levels in underground aquifers.

Geology

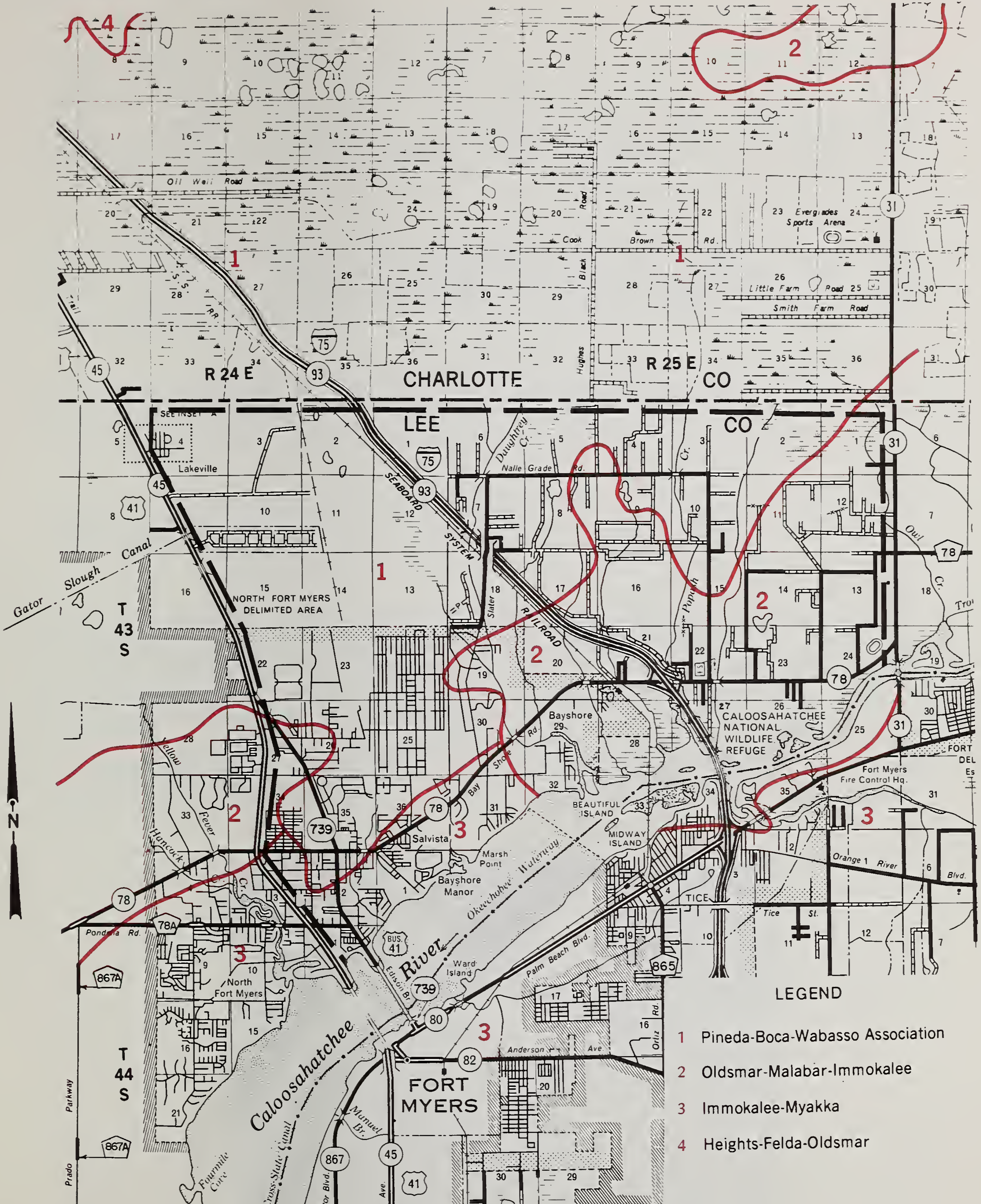
The surface geology of the study area is all recent unnamed sand and shell containing the water table aquifer. It is underlain by a Pleistocene aged unnamed marl shelly sand. The Miocene aged Tamiami Formation begins at approximately 40 feet. It contains a sandstone aquifer. The Hawthorn Formation is from approximately 150 to 550 feet. It is a light gray to white shelly limestone containing the upper and lower Hawthorn aquifers. The Tampa Limestone is from approximately 550 to 775 feet where the Oligocene aged Suwannee Limestone begins.

There has been a gradual decline of water level in the water table aquifer due to increased pumping of the sandstone aquifer since 1969. There are two USGS observation wells within the study area which monitor fluctuations in the ground water levels. Annual reports are issued with these data.

Ground elevations range from 38 feet above mean sea level (National Geodetic Vertical Datum) in the headwaters in Charlotte County to tidewater in Lee County. The average drop in elevation is 2.7 feet per mile or .05 percent slope.

Soils

In the study area (see Figure 2) there are primarily nearly level, poorly drained, sandy soils. The General Soils Map of Lee County shows three soil associations in the study area. The largest is the Pineda-Boca-Wabasso Association characterized by nearly level, poorly drained, deep loamy and moderately deep loamy soils over limestone. The soils of this association have severe limitations for septic tank absorption fields, sewage lagoons, sanitary landfills, dwellings, and streets and roads. They have very low potential for citrus production, moderate potential for truck crops and high potential for improved pasture.



VICINITY MAP

GENERAL SOIL MAP OF STUDY AREA

LEE COUNTY, FLORIDA

0 1 2 3 4 Miles

0 3 6 Km

Approximate Scale

JULY 1984 4-R-38812-2

Figure 2

The second largest soil association found in the study area is the Oldsmar-Malabar-Immokalee Association. It is characterized by having nearly level, poorly drained soils that have a dark, organic stained subsoil. Some soils are sandy throughout and some subsoils are loamy below a depth of 40 inches. A small area is the Immokalee-Myakka Association which is characterized by nearly level, poorly drained soils that have a dark, organic stained subsoil underlain by sandy material.

The General Soils Map of Charlotte County shows the headwater area as being mainly of the Pineda-Boca-Wabasso Association with some small areas of the Oldsmar-Malabar-Immokalee Association and another nearly level poorly drained soil.

The SCS has recently completed a soil survey of Lee County. Copies of this report are available at the local SCS office.

Climate

The study area has a subtropical climate with an annual rainfall of 54 inches and an average temperature of 74°F (see Table 1). The wet season is from June through September and coincides with the hurricane season. During this 4-month period two-thirds of the annual rain occurs. All of the annual precipitation, except for 10 inches, will be lost either through evapotranspiration or deep seepage. Ten inches per year are available for runoff, mostly in the form of overland flow. The average growing season exceeds 320 days with from 325 to 350 frost-free days per year.

Figure 3. Flooding as a result of a monthly total of 9.45 inches of rain in September 1964. The largest 24-hour storm was only 2.78 inches.

Table 1. Temperature and Precipitation Data - Lee County, Florida

Precipitation Normals

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1.64	2.03	3.06	2.03	3.99	8.89	8.90	7.72	8.71	4.37	1.31	1.30	53.95

Mean Temperature

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
63.5	64.7	68.5	75.3	77.7	81.1	82.5	82.8	81.6	76.4	69.4	64.8	73.9

From: U.S. Department of Commerce, National Oceanic and Atmospheric Administration Environmental Data Service for Fort Myers Weather Station 1941-1970.

Natural Values

The entire study area is characterized by broad, low flatwoods interspersed with sloughs and marshes with waters generally draining southward to the Caloosahatchee River.

The south Florida flatwoods community occurs on nearly level, poorly drained soils. During the rainy season, these soils have high water tables, often with water at or above the surface. Typical natural vegetation on these areas consists of slash pine, sawpalmetto, and perennial grasses such as wiregrass, bluestems, and lopsided indiangrass. The flatwoods were logged over in the early part of this century and the grazing-burning practices since then have helped to keep this area in a relatively open savannah type.

The broad drainageways through the flatwoods are known as sloughs or wet prairies. The slough community appears as an open expanse of grasses, sedges and rushes where the soil is saturated throughout the growing season. Most sloughs are relatively long and narrow and slightly lower in elevation than the surrounding flatwoods. Characteristic natural vegetation consists of grasses (blue maidencane, bluejoint panicum, low panicum, and sand cordgrass), beak-rushes, and sloughgrass.

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Depressional areas within the sloughs are occupied by the freshwater marsh vegetative communities. These are very poorly drained areas where the soil is saturated or covered with water for months during the growing season. Characteristic plants occurring in these marshes include maidencane, pickerelweed, arrowheads, sawgrass, fire flag, and cattail.

Where there are defined streams, the natural vegetation in the areas where these join the Caloosahatchee is characteristically in mangrove swamps.

The interspersed flatwoods, sloughs, and marshes support a large variety of wildlife. Mammals include raccoon, otter, opossum, skunk, marsh rabbit, armadillo, deer, bobcat, and feral hogs. Birds include bobwhite quail; several owls, hawks, and woodpeckers; numerous songbirds; and a large variety of wetland birds such as herons, egrets, ibis, bitterns, sandhill cranes, gallinules, and Florida ducks. There are a variety of frogs, turtles, and snakes, with alligators in the larger marshes and ponds.

Endangered or threatened species that occur or whose range indicates they might occur in the area include the alligator, indigo snake, wood stork, perequine falcon, ivory-billed woodpecker, red-cockaded woodpecker, bald eagle, southeastern kestrel, Florida sandhill crane, and Florida panther.

The fisheries resource includes species such as largemouth bass, several species of sunfish, pickerel, catfish, small minnows, bowfin, and gar. Additional species from saltwater areas are found in the mangrove swamps, which are renowned as nursery areas. Few large fish are produced, but the population explosion of small individuals that occurs each rainy season when the habitat expands, serves as the base of the food chain for many of the other animals occurring in the area.

Land Use and Development Trends

Due to its mild climate and other natural values and proximity to the Gulf beaches, the study area has experienced a rapid population increase over the past 12 years. The 1970 census showed Lee County having a population of 105,200. The 1982 census showed 227,300, a 116 percent increase! Lee County is the 12th most populated county in Florida and accounts for 2.19 percent of the State population. It is ranked 13th in population density in the State with 283 persons per square mile. Population projections are 257,700 for 1985, 311,000 for 1990, 400,600 for 2000, and 508,500 for 2020.

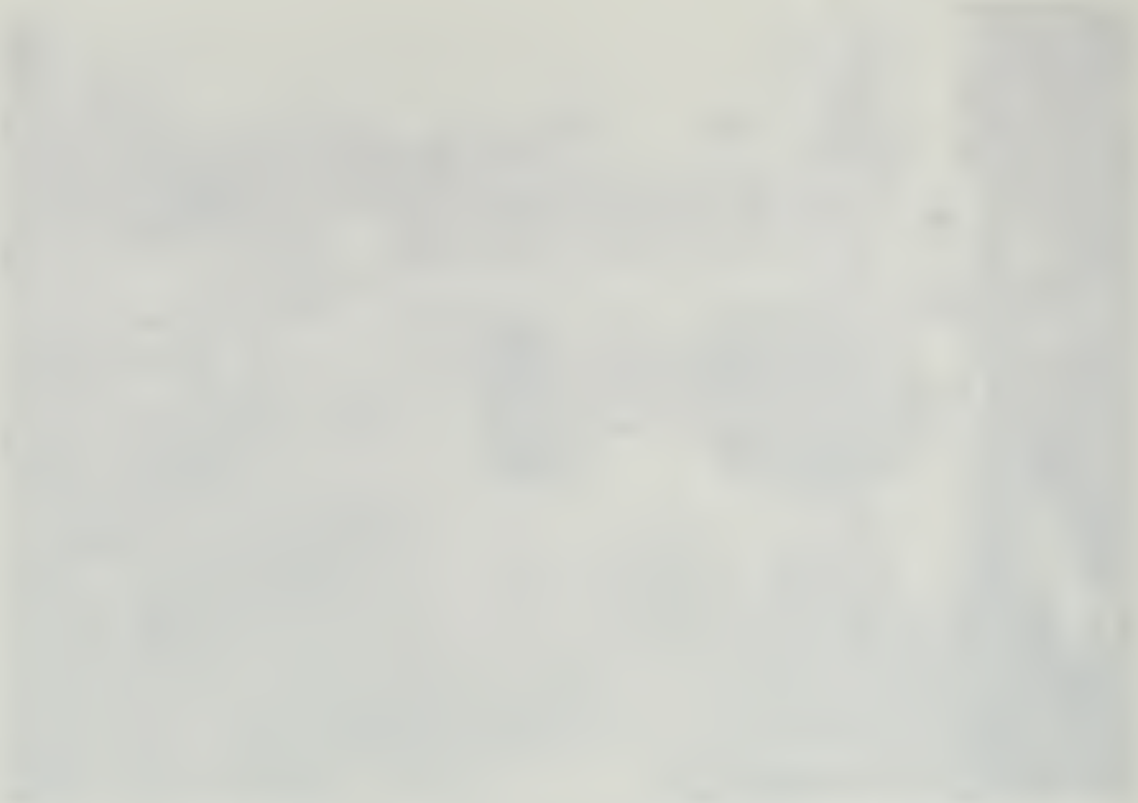
Figure 4. Construction in flood prone area

In 1980, Lee County had 13,257 non-permanent residents. Out of 111,013 total housing units, 2,415 were seasonally vacant. Twenty-six percent of all units are occupied by renters with 74 percent being owner occupied. The average household size is 2.46 persons. In fiscal year 1981 there were 26,701 mobile home tags sold in Lee County and 4,303 parcels of real property. In 1979, 33.8 percent of all housing units were mobile homes.

Most of the forest land in the study area is in slash pine growing in scattered patches intermingled with range. The stands are poorly stocked and growing on areas of poor site quality. No timber is being harvested in the study area and the nearest pulpwood yard is 50 miles away.

There are 15 million pounds of commercial shellfish harvested in Lee County each year and 10 million pounds of other fish.

Other agricultural land uses in Lee County include watermelon, cucumber, and pepper production which employs approximately 645 persons annually. Ornamental horticulture production employs 1,263 persons. Related agricultural services employs 617 persons. A smaller agricultural land use is pasture for beef and dairy production. The total annual net farm income for Lee County was $4,750,000 in 1980.



FLOOD PROBLEMS

There are two types of floods which occur in the study area. Most of the floods are from rainfall occurring between the months of June and September as short duration, high intensity afternoon or evening thundershowers. Rainfall for December through May generally occurs from less frequent, longer duration frontal type storms and may cause flooding in the area. The rainfall type flood is strictly of a fresh water nature. This report deals with the rainfall type flood.

The other type of flood is the tidal or salt water type. It is due to abnormal rises in the water surface of the Gulf and subsequent rises in the Caloosahatchee River. The tidal floods are associated with tropical storms and accompanied by high winds or hurricanes. The damages caused by tidal floods are far worse than those caused by rainfall floods, but the rainfall floods are 10 times more frequent. The damage associated with rainfall floods is a result of water damage alone and is generally not life threatening. The water moves very slowly and the floods are not accompanied with high winds as with hurricanes that are associated with the tidal floods. Occasionally the tidal floods will be accompanied by torrential rains resulting in both types of floods occurring simultaneously. A system for warning residents of the study area of approaching tidal flooding is operated at Page Field Airport, Ft. Myers, Florida, by the U. S. Weather Bureau at the weather station. (For more information on tidal flooding see the July 1980 report by the USGS Water Resources Division titled "Special Flood Hazard Information Report on South Lee County Coastal Areas".)

Flood History

In October 1924, the largest recorded flooding from rainfall occurred over the study area. An area of 350 square miles was flooded for 5 days to an average depth of about 1 foot. Since this flood was the result of an approximate 100-year frequency rainfall, similar results can be expected from future storms of similar frequency and more severe results can be expected from higher frequency storms. Although most roads and railroad tracks were inundated during this flood, the Seaboard Coast Line (SCL) railroad tracks were unaffected.

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Other major floods from rainfall occurred in June 1901, June 1912, September 1935, and September 1962. The 1901 and 1912 floods were almost as large as in 1924. Since 1962, there were seven storms that exceeded the 2-year frequency of 5.0 inches but were less than the 5-year frequency of 6.2 inches.

The worst tidal flood occurred in October 1921 during the most severe hurricane recorded for the study area. The tide rose to 9 feet at Ft. Myers and covered the coastal islands. Other major tidal floods occurred in 1910, 1926, 1944, 1946, and 1960. Both the 1921 and the 1926 floods and associated hurricanes caused over $1 million in damage. With the increase in urbanization and associated increases in property values, similar flood events would have substantially greater damages today.

Flood Potential

Seasonal flooding is common in parts of the study area. During periods of intense or prolonged rainfall, particularly during the summer rainy season, the water table rises above ground surface and begins to flow overland, slowly southward toward the Caloosahatchee River. The soil becomes saturated and the natural sloughs and ponds fill. These slightly flooded conditions can last for 30 days or more. Some problems can occur as a result of this type of yearly flooding.

Figure 5. House was built on raised pad. Damage inside was slight from this one-year frequency storm.

Even when houses are built on earth pads high enough to avoid letting water in, often times driveways and other parking areas, storage buildings, yards, patios and septic systems are not built on a sufficiently high area to avoid flooding. To some families, it may be a major inconvenience not to have the use of their car or yard for several days or even weeks, but a flooded and likely malfunctioning septic system can cause a health threat to the entire community. Problems resulting from this type of flooding are largely the result of uncontrolled and uncoordinated development.

In addition to this yearly flooding larger storms occasionally occur. A flood having an average frequency of occurrence on the order of once in 100 years (a one percent chance of being equalled or exceeded in any given year) is generally used for criteria when designing highway bridges and other structures within a flood plain. However, floods larger than the 100-year flood can and will occur. Even though the maximum known flood on any given stream may have been extremely severe, eventually a larger flood can and probably will occur. In this study, floodwater elevations and peak discharges were generated for the 500-, 100-, 50-, 25-, 10-, 5-, 2- and 1-year rainfall return period for a 24-hour duration. A 100-year rainfall can result in an even larger flood event if the ground is already saturated. The magnitudes of each of these floods were determined by an analysis of the rainfall and runoff characteristics of the contributing drainage areas and by flood routing. The rainfall depths of flood producing storms for the study area are presented in Table 2.

Table 2. Rainfall Frequencies (For a 24 hour storm)-Lee County, Florida

1-year	4.2 inches
2-year	5.0 inches
5-year	6.2 inches
10-year	7.3 inches
25-year	8.7 inches
50-year	10.0 inches
100-year	11.0 inches
500-year	13.5 inches

Flood Hazard Photomaps

There are 6 flood hazard photomaps in this report (Appendix A) showing the areas flooded by the base rainfall flood or 100-year frequency flood. A flood hazard photomap index (Figure 9) is also located in the appendix. The shaded areas on these maps are projected to be flooded by the base flood.

Actual dimensions measured on the ground may vary slightly from those measured on the flood hazard photomaps of this report due to map scale and reproduction limitations. Also due to scale, small raised areas such as houses built on earth pads will not be detectable. Originally, the 500 year frequency flood line was also planned to be shown on these maps but was found that in many areas the two lines were so close together that it was difficult to show both.

Information on the possibility of future floods of various magnitudes and the extent of flooding which might occur is included for the study area. Tables showing the elevations of the 10-, 50-, 100-, and 500-year flood events are included in Appendix C for selected cross sections of the various streams. Cross section locations are shown on individual maps.

Flood Profiles

Flood profiles for various storm frequencies are included in this report as appendix B. The flood profiles show the water surface elevations of the 10-, 50-, 100-, and 500-year frequency floods for present conditions. Included on the profiles are elevations of the stream bed, pertinent bridge and roadway data, and other location data. The profile stationing is in terms of stream distance in feet and is based upon high channel flow distances measured from the 1981 flight of aerial photomaps. Flood depths can be estimated at any location from the water surface profiles.

FLOOD PLAIN MANAGEMENT ALTERNATIVES

By using the maps, tables, and profiles presented in the appendices to this report, flood elevations at locations along the streams may be determined. This information will permit local units of government to implement flood plain management programs which recognize potential flood hazards. Such programs usually limit flood-prone areas to specific uses that would not result in serious economic loss nor loss of life during flood events. Building codes may preclude the flood plain from being used for housing, or it could require that houses be constructed a specific height above flood frequency elevation by building on earth pads or pilings. Generally, flood plain management must be worked out with the landowners involved with consideration given to alternatives available for the local area.

The maps, tables, and profiles are based on conditions that existed in 1983. Such factors as increased urbanization, encroachment on flood-prone areas, relocation or modification of bridges and other stream crossings, and stream channel modification can have significant effects on flood stages and areas inundated. Therefore, the results of any flood hazard evaluations should be reviewed periodically by appropriate state and local officials and planners to determine if changed watershed conditions would significantly affect future flood elevations.

Based on the flood plain areas identified in this report, the SCS recommends that an effective flood plain management program be implemented and maintained. It is recommended that the city develop a program to publicize the availability of flood insurance and encourage community residents to participate in the program, especially those located in or near flood-prone areas. Residents in flood-prone areas should be made aware of the impacts of non-participation in the National Flood Insurance Program.

Flood insurance was established by the National Flood Insurance Act of 1968 (Public Law 90-448, as amended) to make limited amounts of flood insurance, which was previously unavailable from private insurers, available to property owners and occupiers. The Flood Disaster Protection Act of 1973 (Public Law 93-234, as amended) was a major expansion of the National Flood Insurance Program. Flood Insurance is available through local insurance agents and brokers only after a city or county applies and is declared eligible for the program by the Federal Insurance Administrator, U. S. Department of Housing and Urban Development (HUD). Adoption and enforcement of a local flood prevention ordinance which meets HUD minimum flood plain management criteria is necessary to qualify and maintain community eligibility. The Federal Emergency Management Agency (FEMA) provides large scale flood maps for many urban areas. HUD uses these maps to determine rates of insurance.

In those communities participating in the HUD program, owners and occupiers of all buildings and mobile homes in the entire community are eligible to obtain flood insurance coverage. It is recommended that buildings and mobile homes within or adjacent to the delineated flood hazard areas carry flood insurance on the structure and contents.

The SCS can provide technical assistance through the Lee County Soil and Water Conservation District to Federal, State, and local agencies in the interpretation and use of the information contained herein and will provide additional technical assistance and data needed in local flood plain management programs upon request, as funding and personnel limitations permit.

Flood damage reduction can only be achieved through proper recognition of the hazards associated with flood plain development. Flood damages can be minimized by careful planning and proper flood plain management. Flood plain management programs should contain both preventive and corrective measures.

Preventive measures do not prevent flooding. These measures reduce the threat of damage or loss of life from flooding by regulating development in the flood plains. Preventive measures can include flood plain regulations, development policies, greenbelts or open spaces, tax adjustments, and flood warning systems.

Corrective measures also do not necessarily eliminate flooding. These measures can reduce the extent of flooding and flood damages. Corrective measures are usually physical measures and can include land treatment, floodwater retarding structures, channel rectification, floodproofing of structures, and evacuation of flooded areas.

Preventive Measures

Encroachment lines are the lateral boundaries of a designated floodway. They are definitely established lines, one on each side of the stream. Between these lines no construction or filling which causes an impediment to flow should be permitted.

Zoning is a legal method used to implement and enforce the details of the flood plain management program, to preserve property values, and to achieve the most appropriate and beneficial use of available land. Clear, concise, and thorough zoning bylaws with enforcement of the bylaws are essential to make zoning effective.

Subdivision regulations are used to specify the manner in which land may be subdivided. Regulations may state the required width of streets, requirements for curbs and gutters, size of lots, percentage of open space, and other points pertinent to the welfare of the community.

Building codes are developed to set up minimum standards for controlling the design, construction, and quality of materials used in buildings and structures within a given area to provide safety for life, health, property, and public welfare. Building codes can be used to minimize construction and subsequent damages resulting from inundation. Proper building restriction codes can specify adequate anchorage to prevent flotation of buildings from their foundations, prohibit storage of hazardous chemical or electrical equipment storage and establish minimum building foundation elevations.

Development policies are sound policies and decisions which are designed to prevent construction of streets and utility systems in flood prone areas. This tends to slow development of the flood plains.

Greenbelt is a term related to the development and retention of stream frontages and flood plains. The use of these public and private lands for pasture or grazing, picnic areas, golf courses, and similar uses would materially reduce the damage potential in a high hazard flood plain area.

Tax adjustments for land that is used for agriculture, recreation, conservation, or other open space uses, may be effective in preserving natural floodways along streams.

Flood warning systems should be coordinated with local disaster plans. The National Weather Service issues warning of potential flood producing storms. On small watersheds, staff gages set at key locations can be monitored to give advance warnings upon flood prone areas. A float activated, battery powered signal connected to the local police or fire station would be desirable if high risks are involved.

Corrective Measures

Land treatment practices modify floods by increasing infiltration and decreasing the amount and rate of runoff. Practices include vegetative cover, runoff interceptors and diversions, erosion control structures, terraces, and cropping management practices. They can be especially important in reducing erosion and the resulting amount of sediment and pollutants carried downstream.

Floodwater retarding structures are earthfill or concrete impoundments to check the uncontrolled flow of floodwater. These structures are usually located to intercept the water from large drainage areas thus providing the maximum amount of downstream protection possible. Retarding structures may include dug pits in areas where ground water tables are well below the ground surface. Such pits require that stored water be pumped out following each storm event.

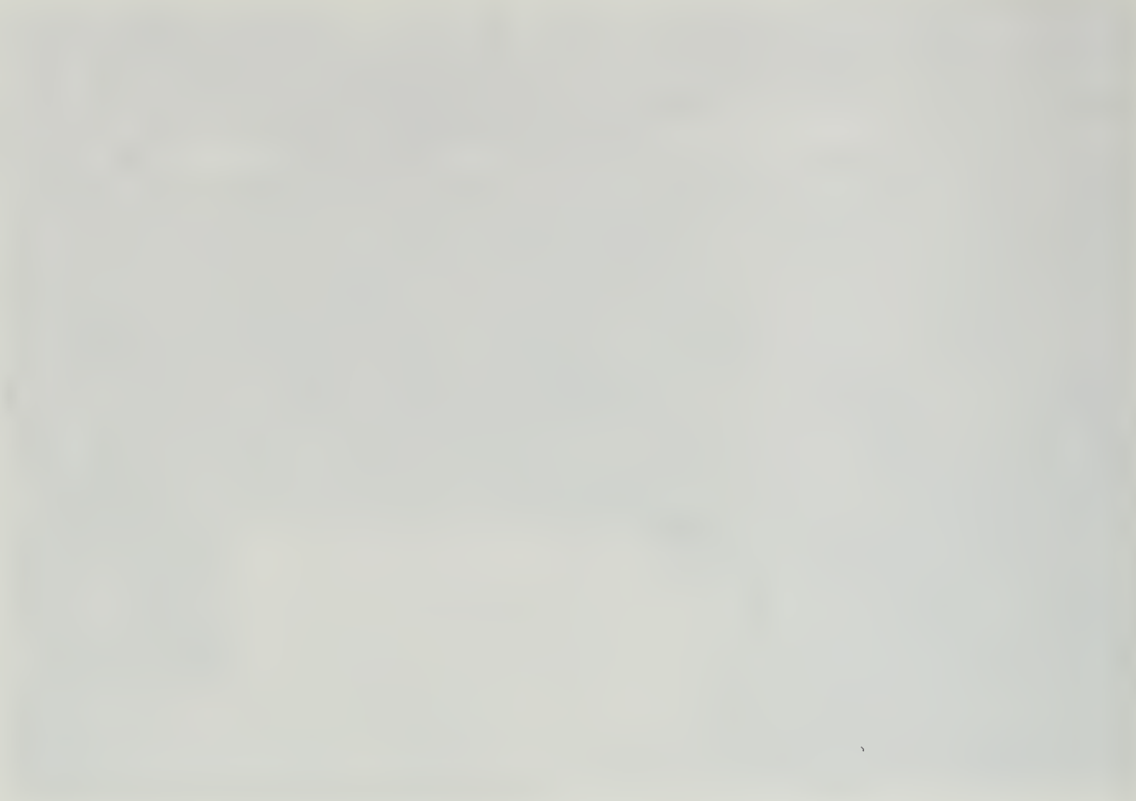
Channel alteration may be considered to improve the flow characteristics of the channel to enable it to safely pass the design flood. Such improvement is usually accomplished by enlarging, straightening, and/or lining the channel with due regard to minimizing the effect on surrounding natural environment. Channel work is likely to be cost prohibitive for the study area.

Maintain culverts and road ditches so that they are free of debris and allow water to flow freely.

Figure 6. Culvert filled with sediment and vegetation on L-1 (Trib to Yellow Fever Creek). This culvert will be ineffective and street flooding will result.

Figure 7. Improved road crossing of Marsh Point Creek at Bayshore Road. View is of upstream side of bridge.

Figure 8. Typical culvert system on Powell Creek Trib (U.S.41) Canal during dry season. View is of the downstream side of road.



Permanent evacuation of developed areas subject to inundation usually involves the acquisition of lands by purchase, the removal of improvements, and the relocation of the population from such areas. Such lands could be used for parks and other purposes that would not suffer large flood damages and would not interfere with flood flows.

Flood proofing can reduce flood damages by a combination of structural provisions and changes or adjustments to properties subject to flooding. Examples of flood proofing are sealing low window and door openings, and modifying floor drains to prevent the entrance of flood waters.

Combinations of various types of practices, both structural and nonstructural, can normally provide a higher degree of flood protection, at less cost, than most individual types of practices by themselves, especially in highly developed flood plains similar to the Lee County flood hazard area. Careful intermixing of the most cost effective and socially acceptable individual measures can enhance the potential to provide a socially acceptable level of protection.

Local Recommendations

This report should be adequately publicized for its findings to be made available to property owners and occupiers in the study area.

GLOSSARY OF TERMS

Bridge Area -- The effective hydraulic flow area of a bridge opening accounting for the presence of piers, attached conduits, and skew (alignment), if applicable.

Channel -- A natural or artificial water course of perceptible extent with definite bed and banks to confine and conduct continuously or periodically flowing water.

Flood -- An overflow of water on lands not normally covered by water. Floods have two essential characteristics: the inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river, stream, ocean, lake, or other body of standing water.

Flood Crest -- The maximum stage of elevation reached by the waters of a flood at a given location.

Flood Frequency -- A means of expressing the probability of flood occurrences as determined from a statistical analysis of representative streamflow or rainfall and runoff records. It is customary to estimate the frequency with which specific flood stages or discharges may be equalled or exceeded, rather than the frequency of an exact stage or discharge. Such estimates by strict definition are designated "exceedance frequence", but in practice the term "frequency" is used. The frequency of a particular stage or discharge is usually expressed as occurring once in a specified number of years. Also see definition of "recurrence interval." For example, see "100-year Flood" below:

> 100-year flood - a flood having an average frequency of occurrence in the order of once in 100 years. It has a 1 percent chance of being equalled or exceeded in any given year. It is based on statistical analyses of rainfall and runoff characteristics in the general region of the watershed.

Flood Hazard Area -- Synonymous with Flood Plain (general). Commonly used in reference to flood map.

Flood Peak -- The highest stage or discharge attained during a flood event; also referred to as peak stage or peak discharge.

Flood Plain (general) -- The relatively flat area or low lands adjoining the channel of a river, stream, or watercourse; ocean, lake, or other body of standing water which has been or may be covered by floodwater.

Flood Plain (specific) -- A definitive area within a flood plain (general) or flood-prone area known to have been inundated by a historical flood, or determined to be inundated by floodwater from a potential flood of a specific frequency.

Flood Prone Area -- Synonymous with Flood Plain (General)

Flood Profile -- A graph showing the relationship of water surface elevation to stream bed. It is generally drawn to show the water surface elevation for the peak of a specific flood, but may be prepared for conditions at a given time or stage.

Hydrologic Boundary - The divide separating adjoining watersheds

Potential flood -- A spontaneous event (natural phenomenon) capable of occurring from a combination of meteorological, hydrological, and physical conditions; the magnitude of which is dependent upon specific combinations. See Flood and Flood Frequency.

Recurrence Interval -- The average interval of time based on a statistical analysis of actual or representative streamflow records which can be expected to elapse between floods equal to or larger than a specified stage or discharge. Recurrence interval is generally expressed in years. Also see definition of Flood Frequency.

Runoff -- That part of precipitation as well as any other flood contributions, which appears in surface streams of either perennial or intermittent form.

Stream Bed -- The lowest part of the stream channel (either in a constructed cross section or a natural channel). Bottom elevations at a series of points along the length of a stream may be plotted and connected to provide a stream bottom profile. (This is often referred to as the "stream bed" and is so designated on the flood profiles in Appendix B).

Stream Channel Flow -- That water which is flowing within the limits of a defined watercourse.

Structural Bottom of Opening -- The lowest point of a culvert or bridge opening with a constructed bottom through which a stream flows that could tend to limit the stream channel bottom to that specific elevation. This structural bottom may be covered with sediment or debris which further restricts the size of the opening.

Watershed -- A drainage basin or area which collects and transmits runoff usually by means of streams and tributaries to the outlet of the basin.

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3 260 0 Gainesville FL : b U.S. Department of Agriculture, Soil Conservation Service, c 1984.

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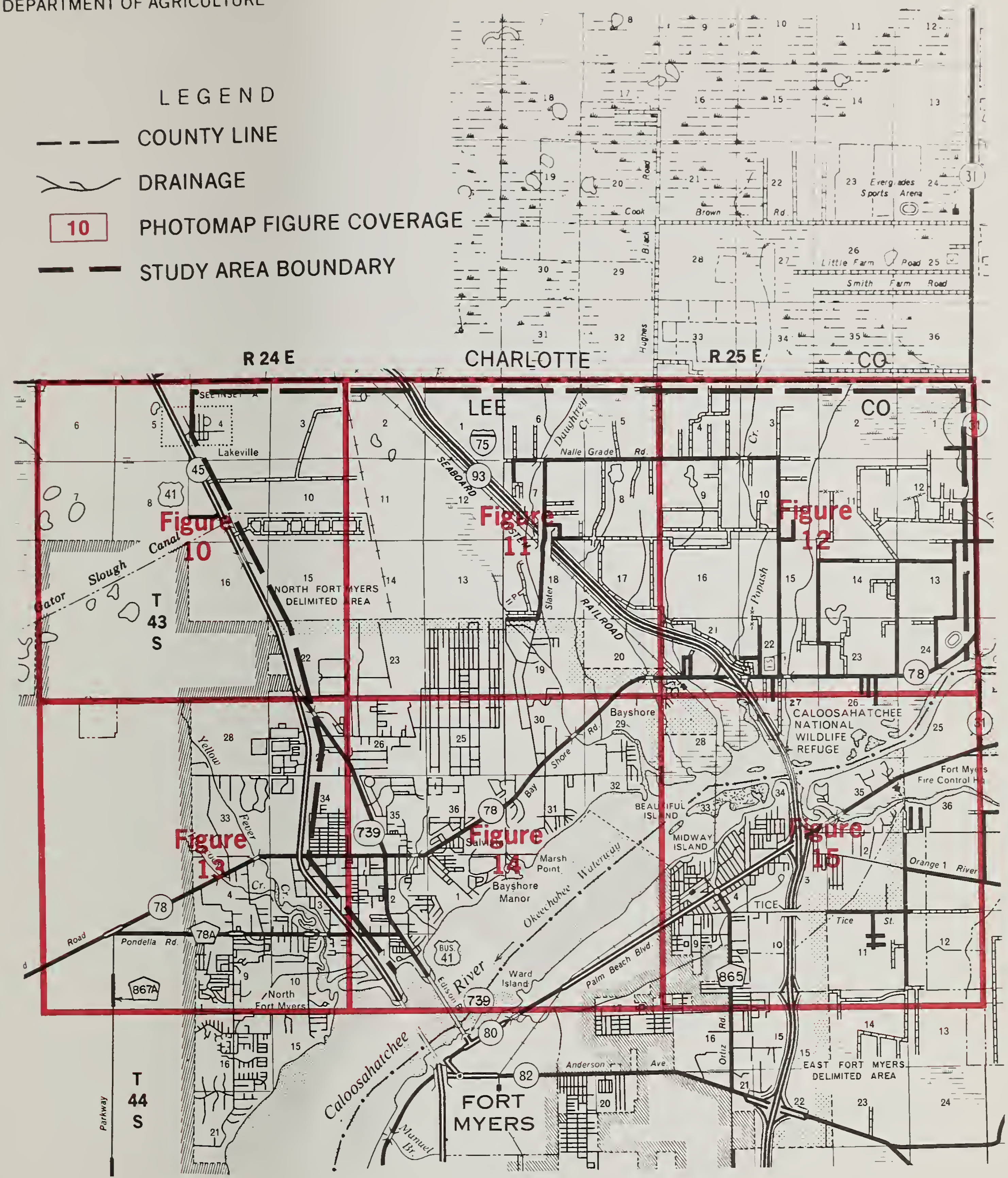
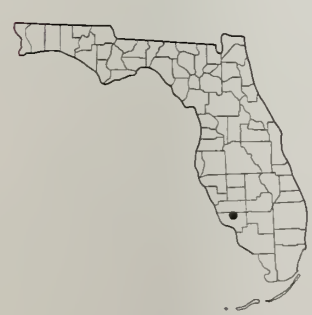
APPENDIX A

FLOOD HAZARD PHOTOMAPS



FLOOD HAZARD PHOTOMAP INDEX

LEE COUNTY, FLORIDA



VICINITY MAP

JULY 1984 4-R-38812-1

Figure 9

Figure 13

Figure 10

FLOOD HAZARD AREA
LEE COUNTY, FLORIDA

N

LEGEND

100 Year Flood Hazard Area

Cross Section Location

Stream channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

0 1000 2000 Feet
0 250 500 Meters
SCALE

SOURCE: 1-81 FILM FROM HAMRICK AERIAL SURVEYS, INC. HYDROLOGIC DATA FROM SCS FIELD STAFF

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLOOD PLAIN MANAGEMENT STUDY
GAINESVILLE, FLORIDA

FLOOD HAZARD AREA
LEE COUNTY, FLORIDA

LEGEND

100 Year Flood Hazard Area

Cross Section Location

Stream channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

0 1000 2000 Feet
0 250 500 Meters
SCALE

SOURCE 1-81 FILM FROM HAMRICK AERIAL SURVEYS, INC. HYDROLOGIC DATA FROM SCS FIELD STAFF.

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SOIL CONSERVATION SERVICE
LEE COUNTY
FLOOD PLAIN MANAGEMENT STUDY
GAINESVILLE, FLORIDA

FLOOD HAZARD AREA
LEE COUNTY, FLORIDA

LEGEND

100 Year Flood Hazard Area

Cross Section Location

Stream channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

0 1000 2000 Feet
0 250 500 Meters
SCALE

SOURCE 1-81 FILM FROM HAMRICK AERIAL SURVEYS, INC HYDROLOGIC DATA FROM SCS FIELD STAFF

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LEE COUNTY
FLOOD PLAIN MANAGEMENT STUDY
GAINESVILLE, FLORIDA

FLOOD HAZARD AREA
LEE COUNTY, FLORIDA

LEGEND

100 Year Flood Hazard Area

Cross Section Location

Stream channel

NOTE
LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

0 1000 2000 Feet
0 750 500 Meters
SCALE

SOURCE 1-81 FILM FROM HAMRICK AERIAL SURVEYS, INC. HYDROLOGIC DATA FROM SCS FIELD STAFF

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY

FLOOD PLAIN MANAGEMENT STUDY

GAINESVILLE, FLORIDA

FLOOD HAZARD AREA

LEE COUNTY, FLORIDA

LEGEND

100 Year Flood Hazard Area

Cross Section Location

Stream channel

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LIMITS OF FLOODING SHOWN MAY VARY FROM ACTUAL LOCATIONS ON THE GROUND AND DUE TO INHERENT AERIAL PHOTOGRAPHIC DISPLACEMENT THE PHOTOGRAPHIC IMAGE MAY VARY FROM TRUE GROUND LOCATION

0 1000 2000 Feet
0 250 500 Meters
SCALE

SOURCE: 1-81 FILM FROM HAMRICK AERIAL SURVEYS, INC. HYDROLOGIC DATA FROM SCS FIELD STAFF

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SOIL CONSERVATION SERVICE

LEE COUNTY

FLOOD PLAIN MANAGEMENT STUDY

GAINESVILLE, FLORIDA

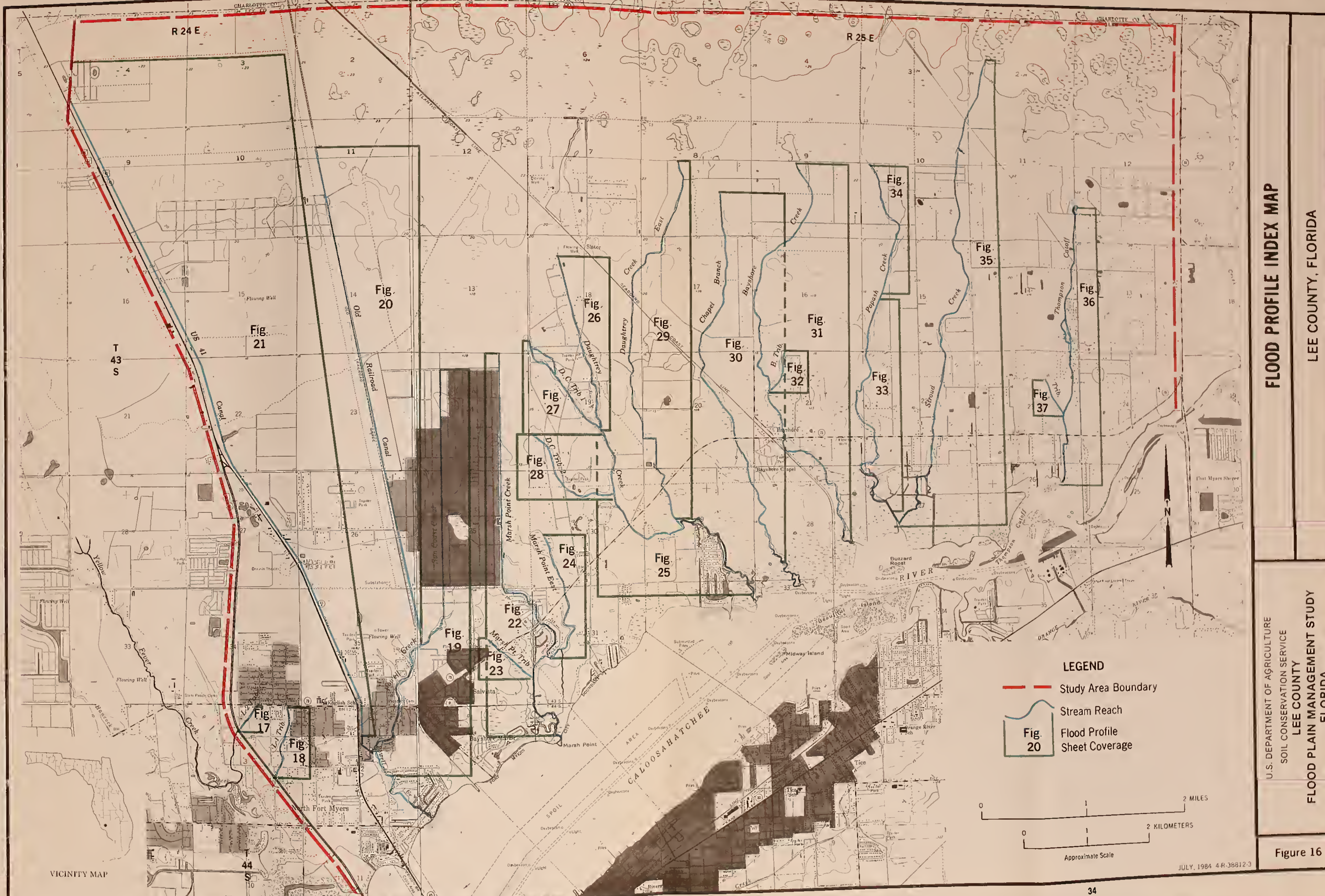
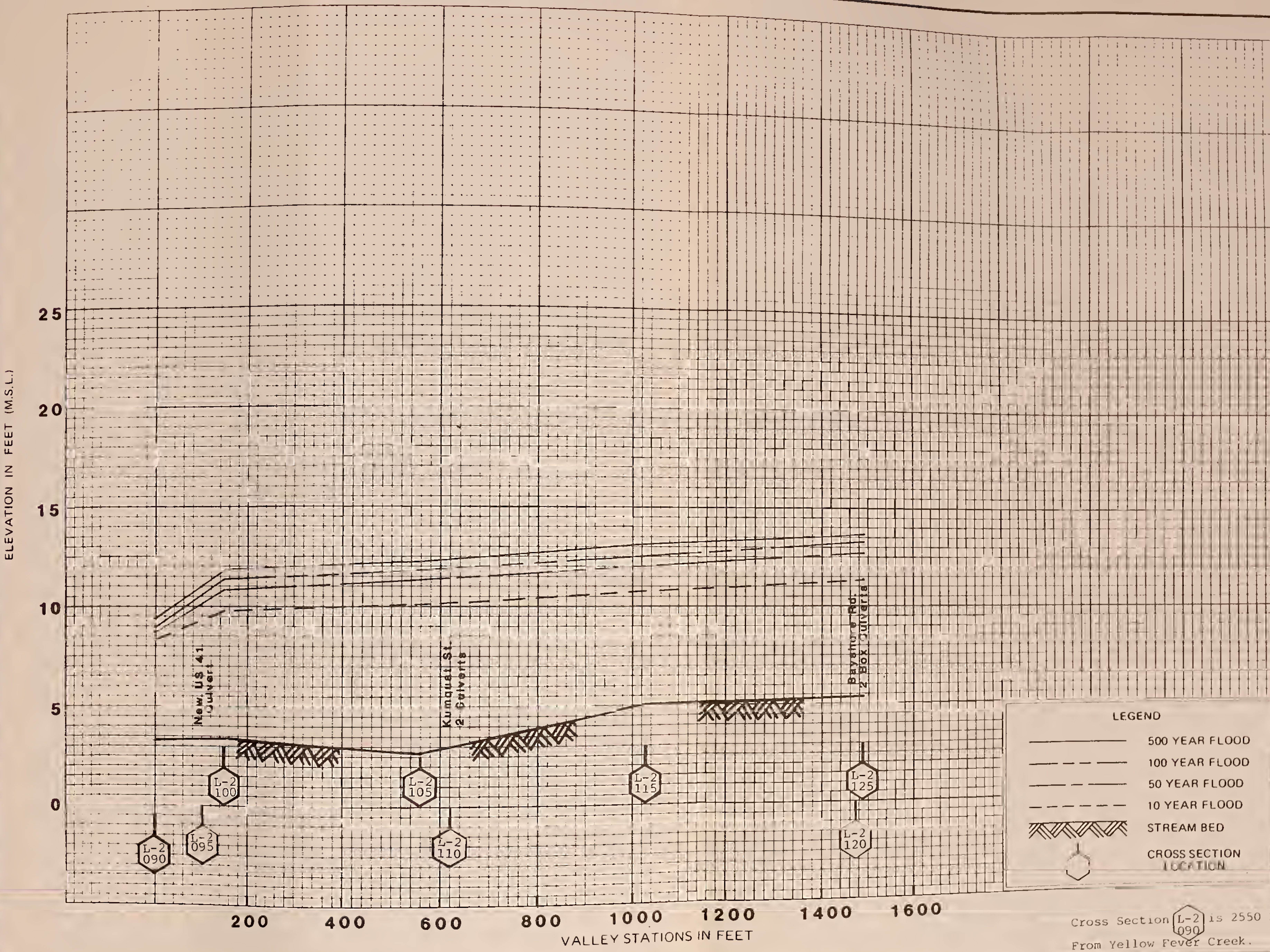


Figure 16

USDA-SCS FORT WORTH, TEXAS 1985



Cross Section L-2 090 is 2550 Feet From Yellow Fever Creek.

FLOOD PROFILES

L-2 (TRIB TO YELLOW FEVER CREEK)

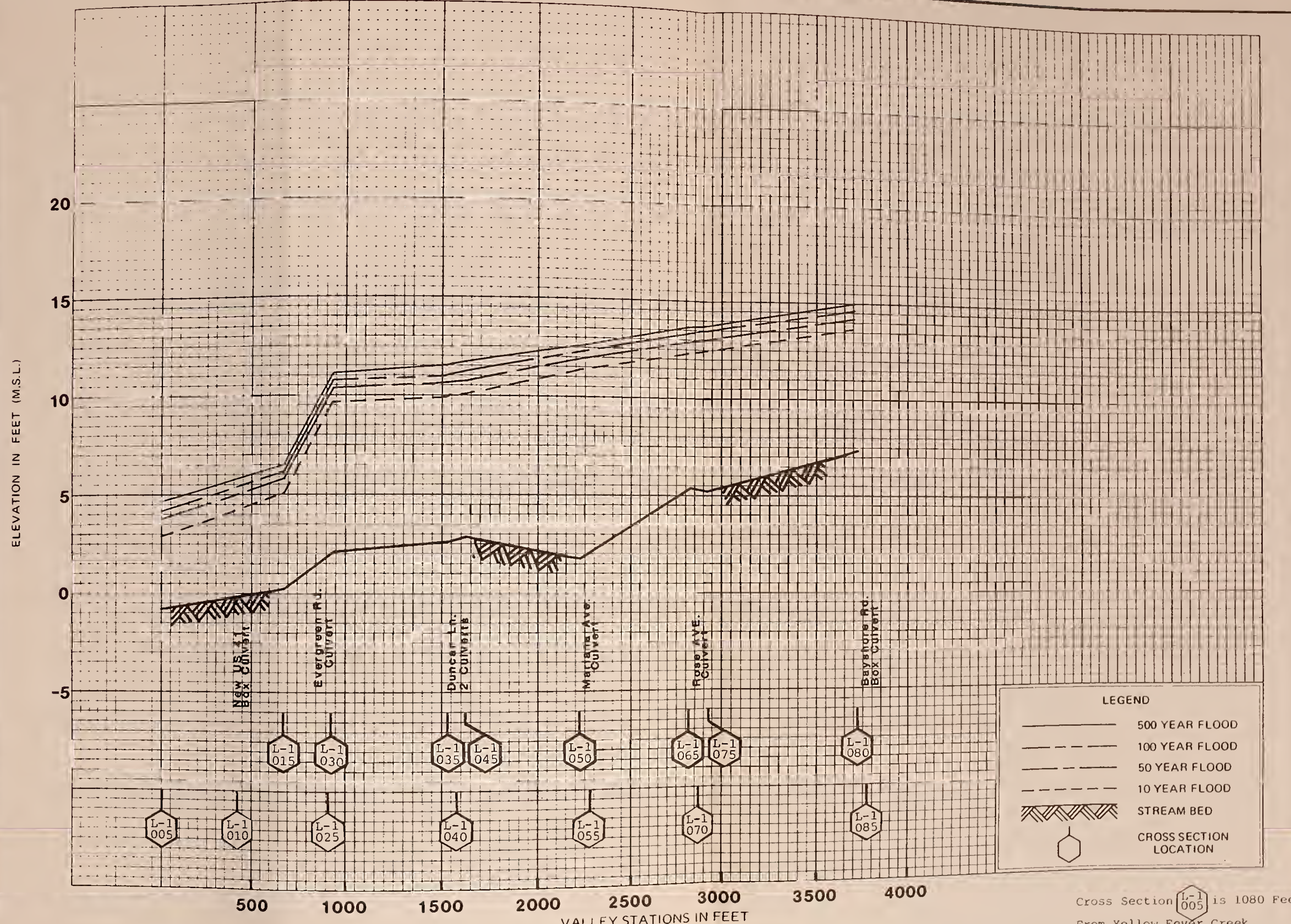
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig. 17

FLOOD PROFILES

L-1 (TRIB TO YELLOW FEVER CREEK)

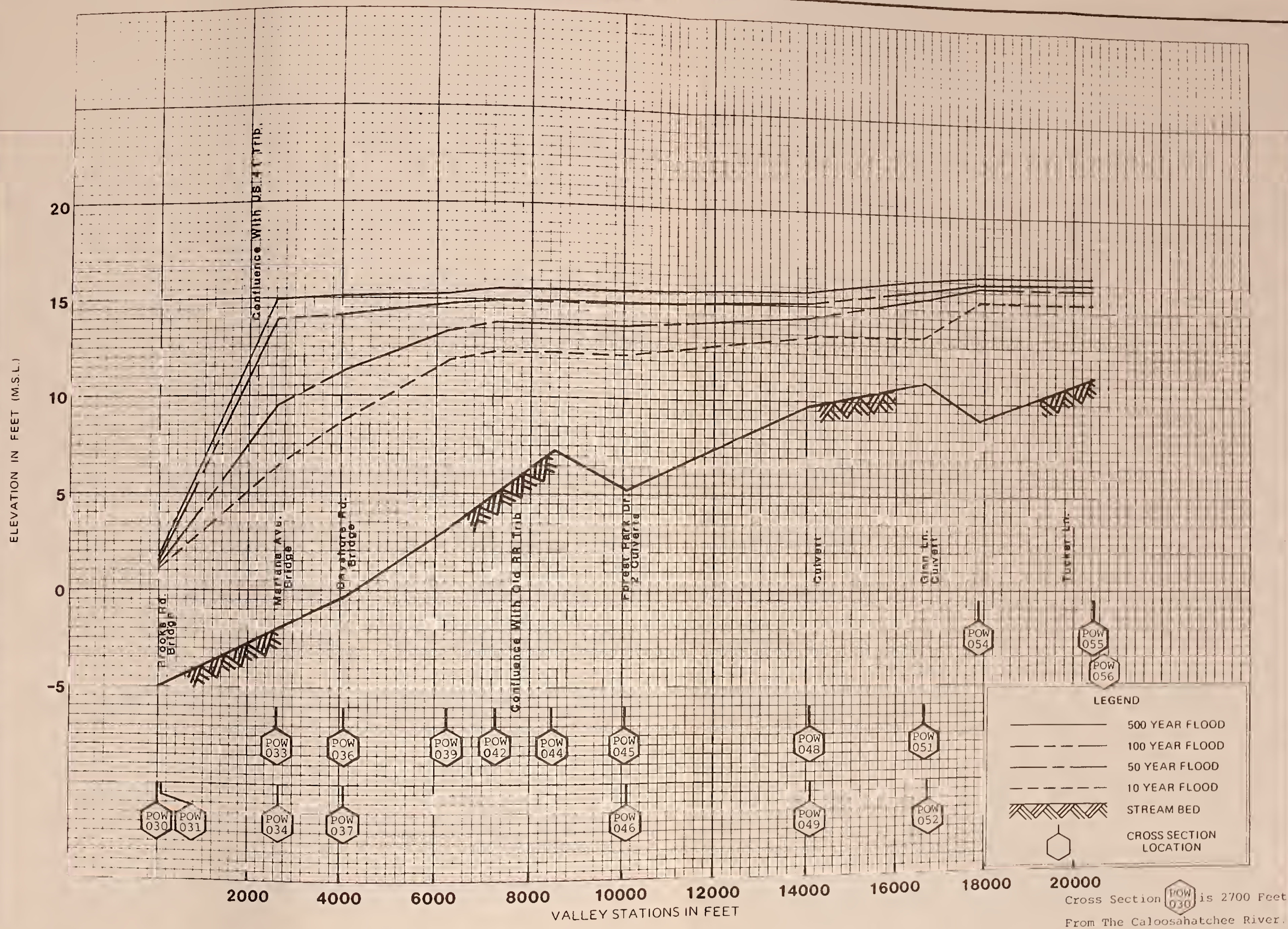


Cross Section L-1 005 is 1080 Feet From Yellow Fever Creek.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.18



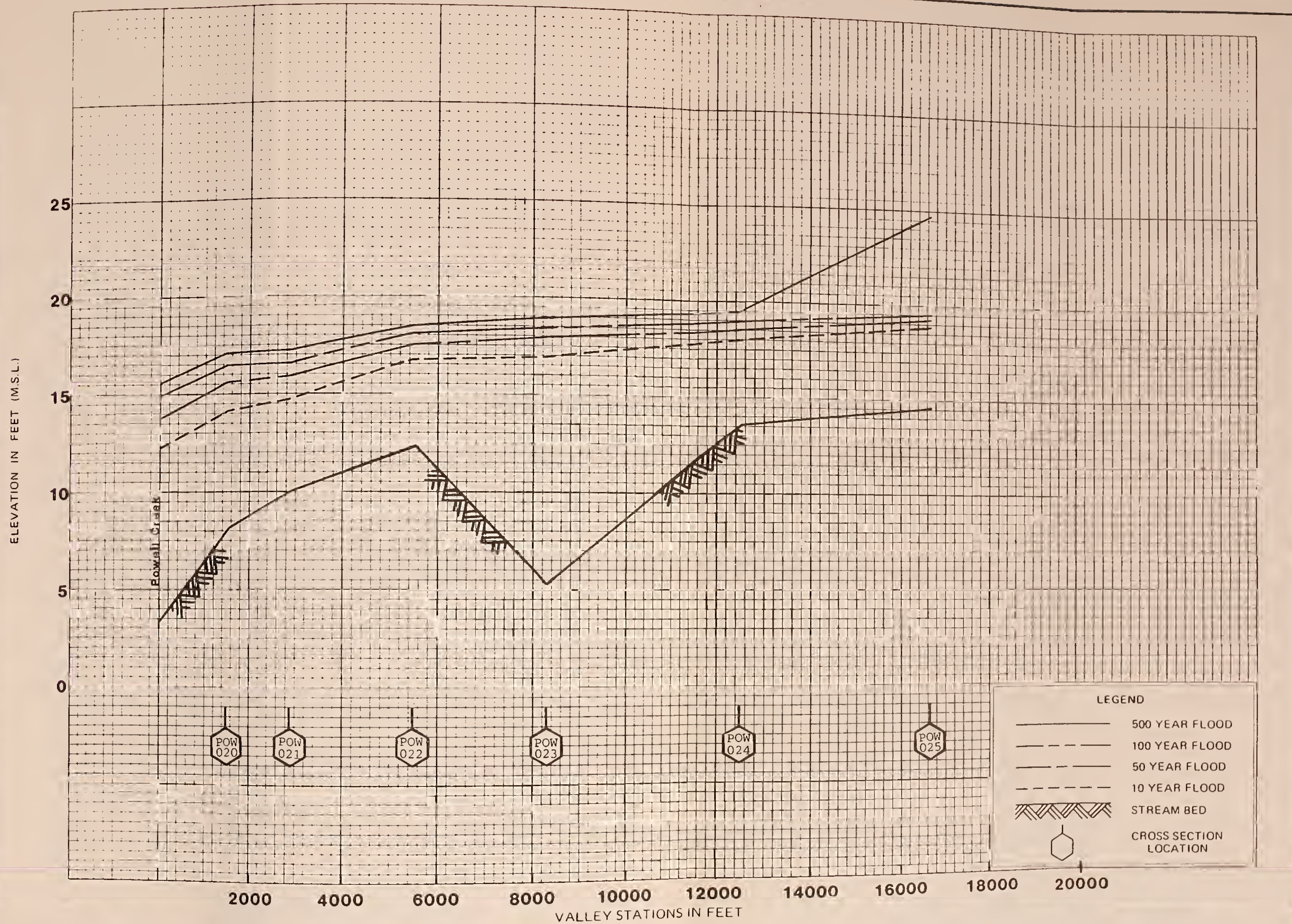
FLOOD PROFILES

POWELL CREEK (WITH SUNCOAST CANAL)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.19



38

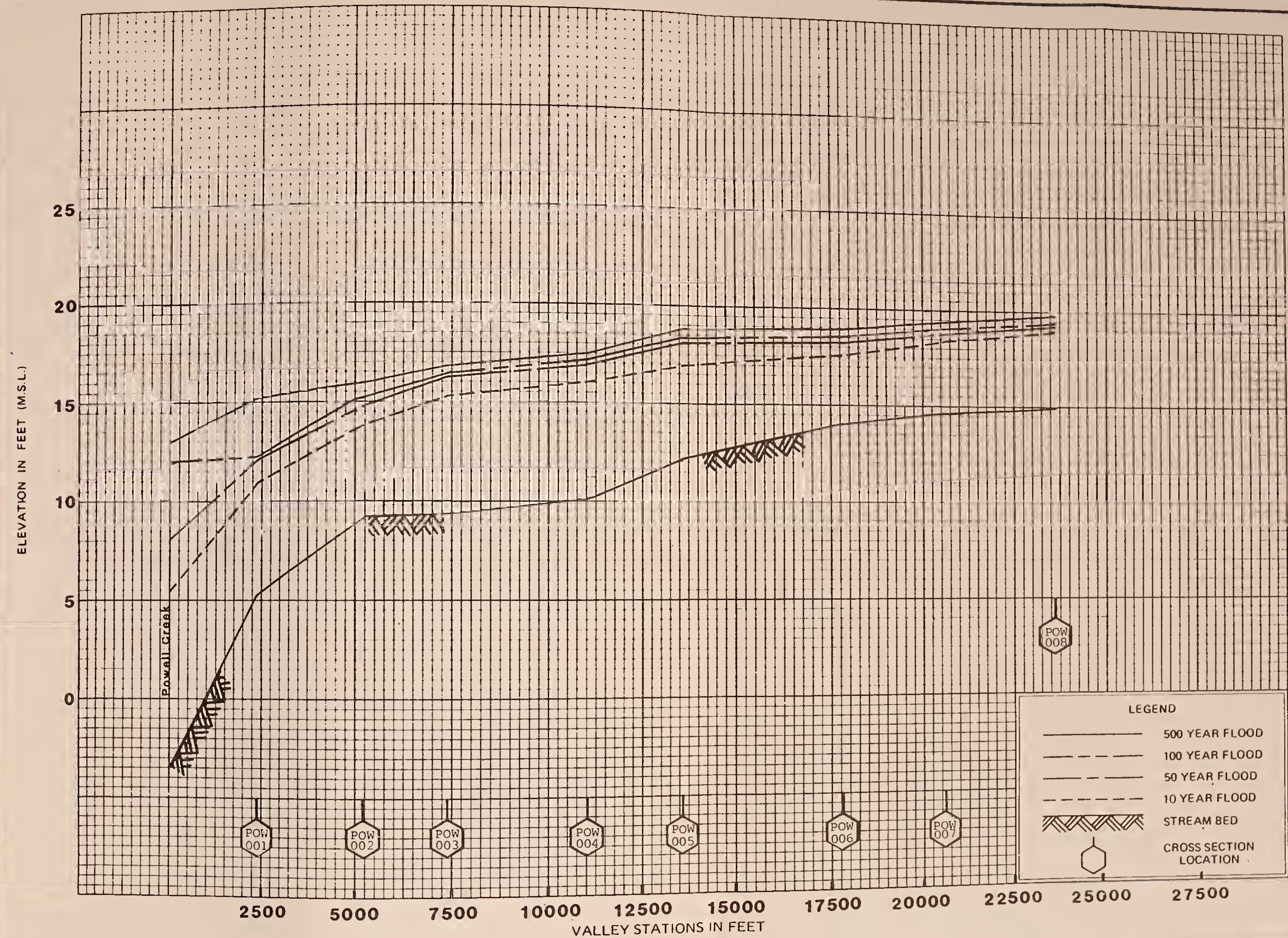
FLOOD PROFILES

POWELL CREEK TRIB (OLD RAILROAD GRADE)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.20



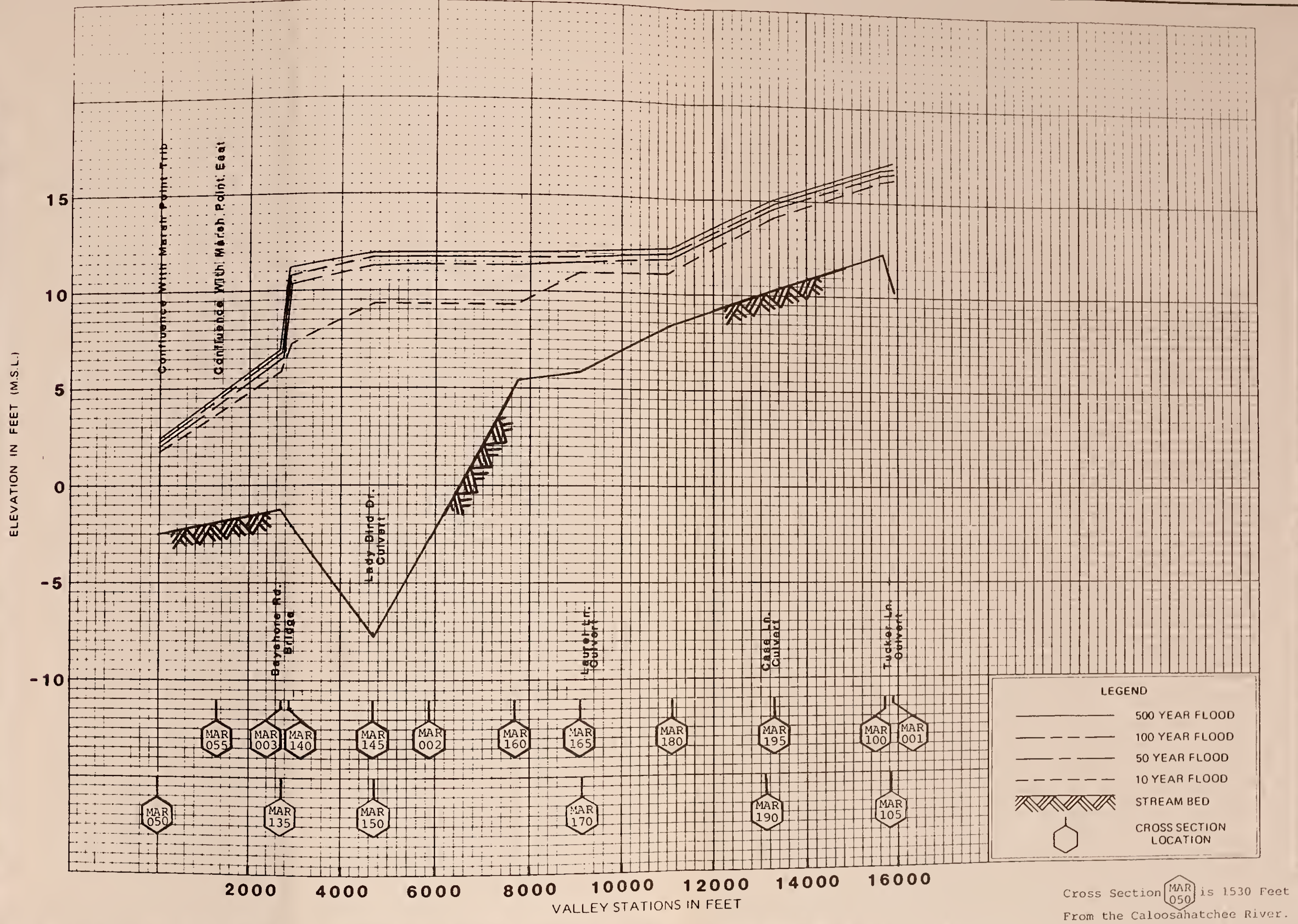
FLOOD PROFILES

POWELL CREEK TRIB (US 41 CANAL)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.21



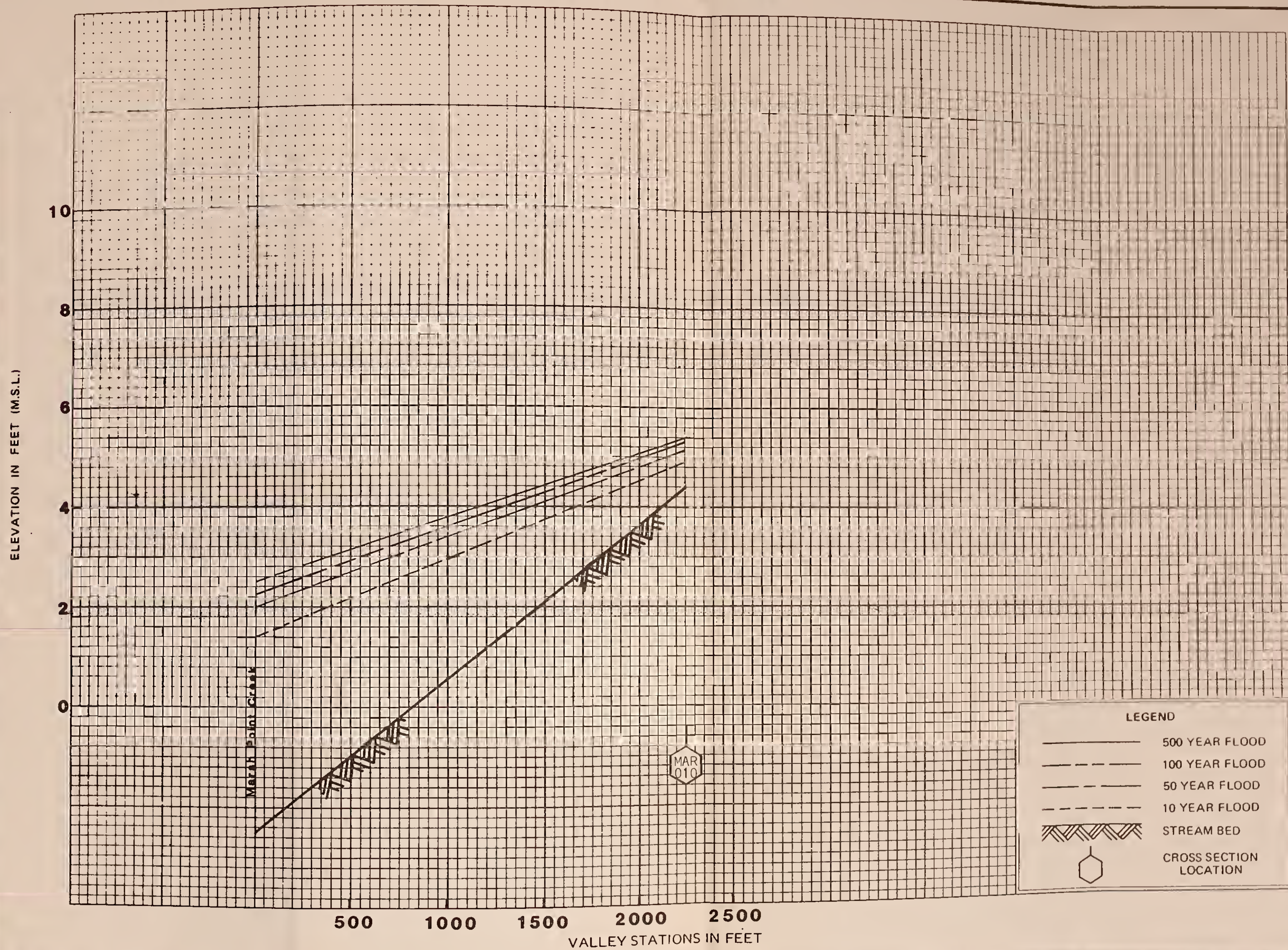
FLOOD PROFILES

MARSH POINT CREEK

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.22



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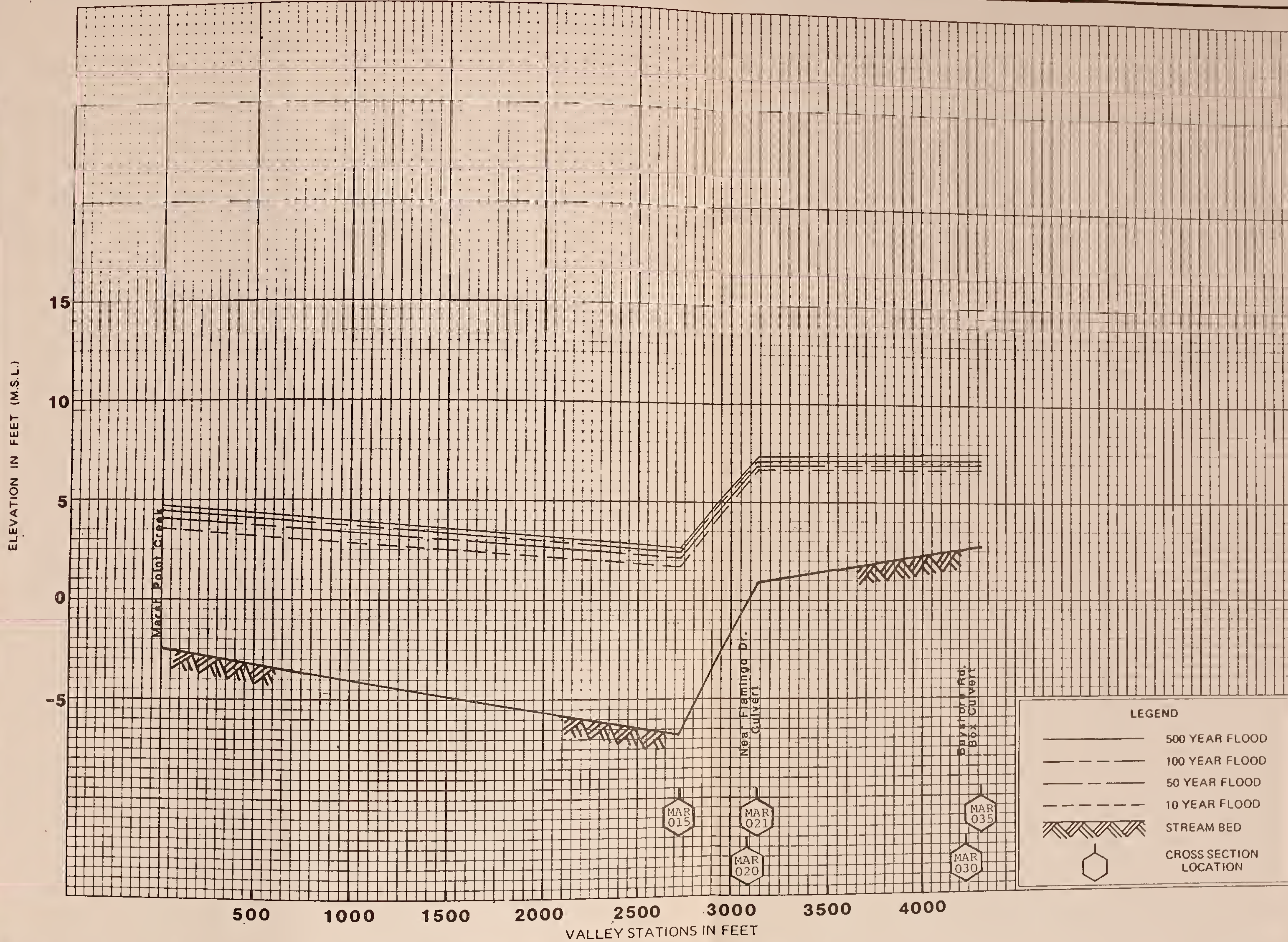
FLOOD PROFILES

MARSH POINT CREEK TRIB

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.23



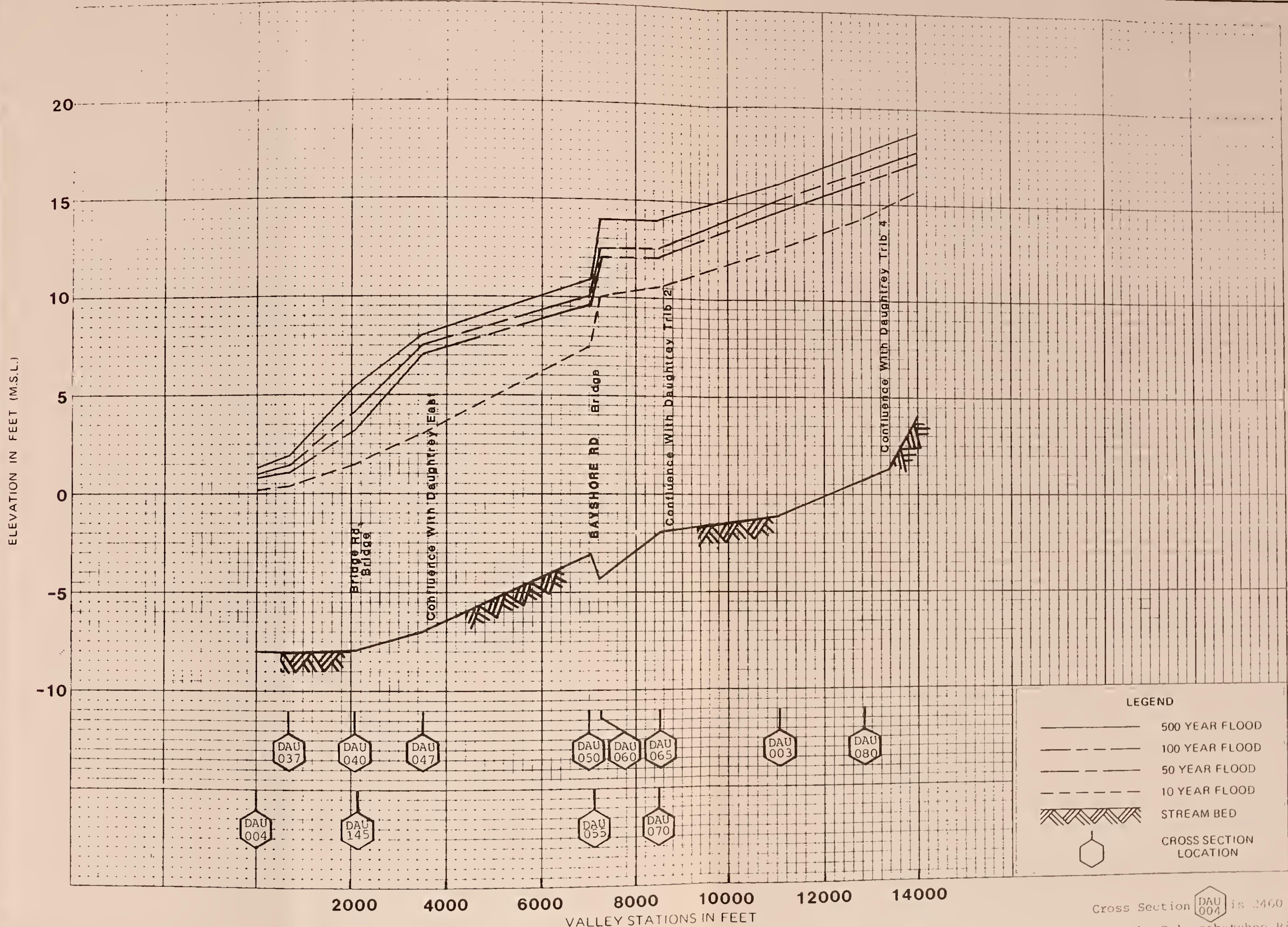
FLOOD PROFILES

MARSH POINT EAST

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.24



Cross Section DAU 004 is 2460 Feet From The Caloosahatchee River.

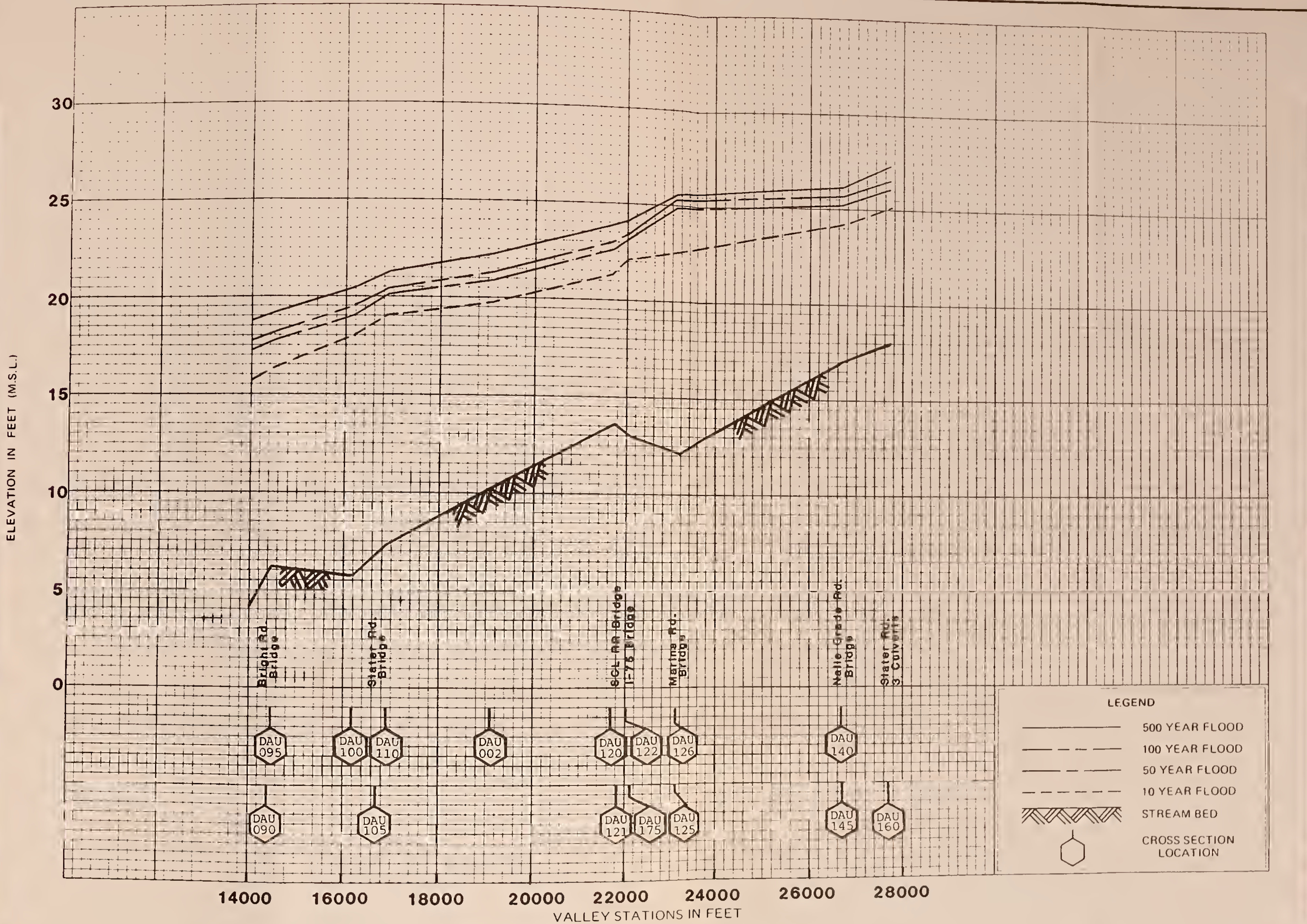
FLOOD PROFILES

DAUGHTREY CREEK (LOWER PART)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.25



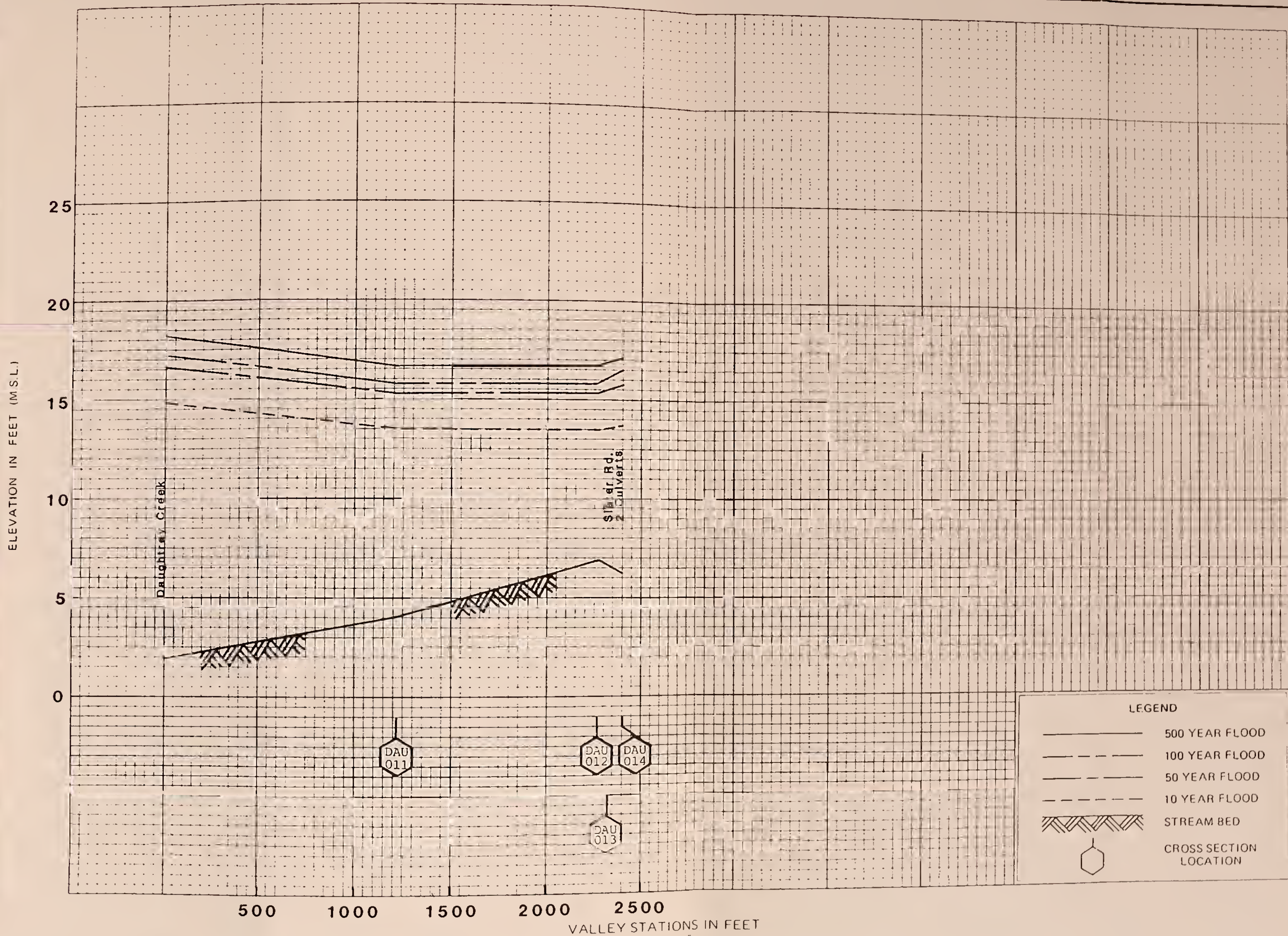
FLOOD PROFILES

DAUGHTREY CREEK (UPPER PART)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.26



U.S. DEPARTMENT OF AGRICULTURE
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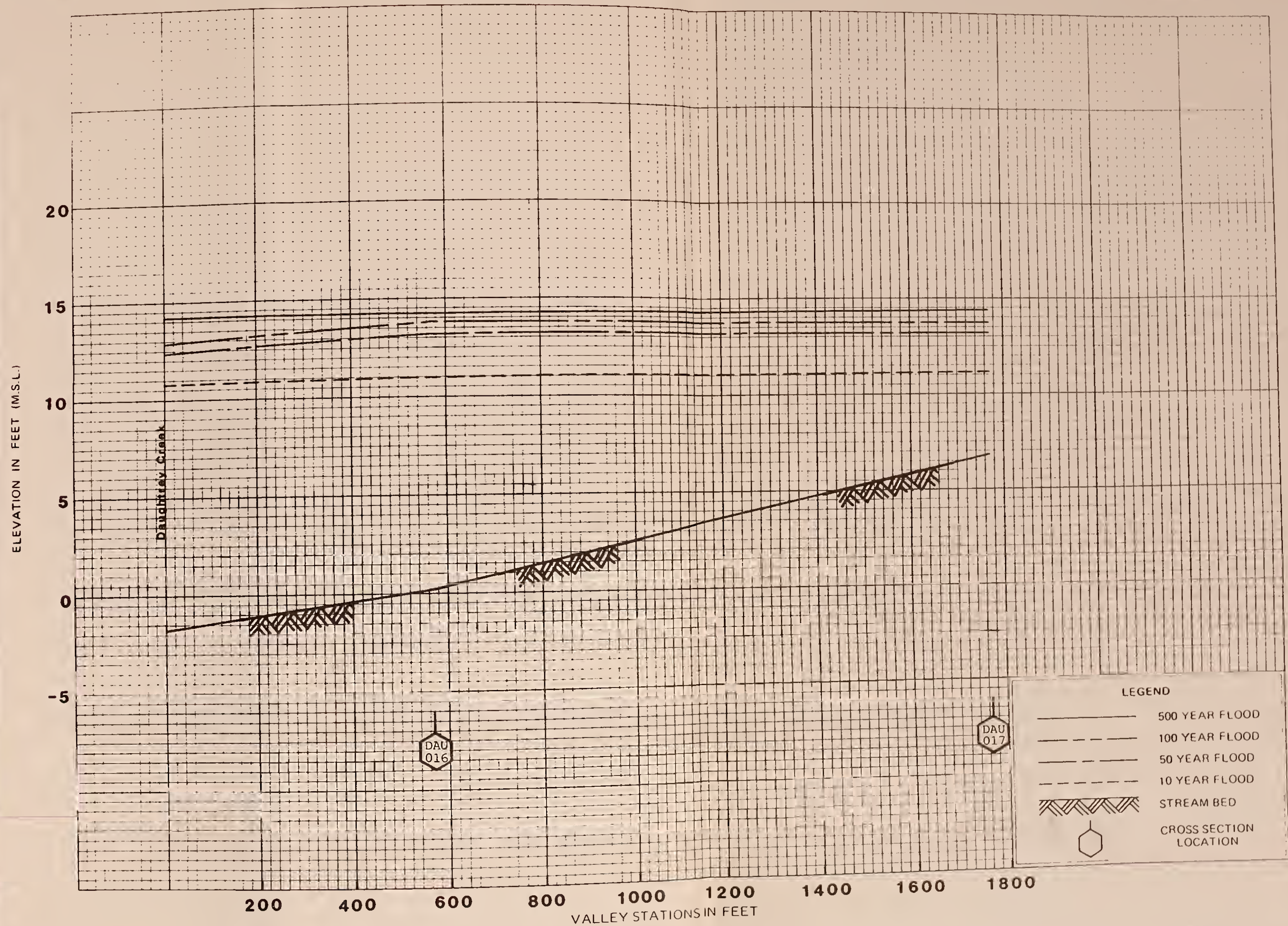
LEE COUNTY
FLORIDA

FLOOD PROFILES

DAUGHTREY CREEK TRIB(1)

Fig.27



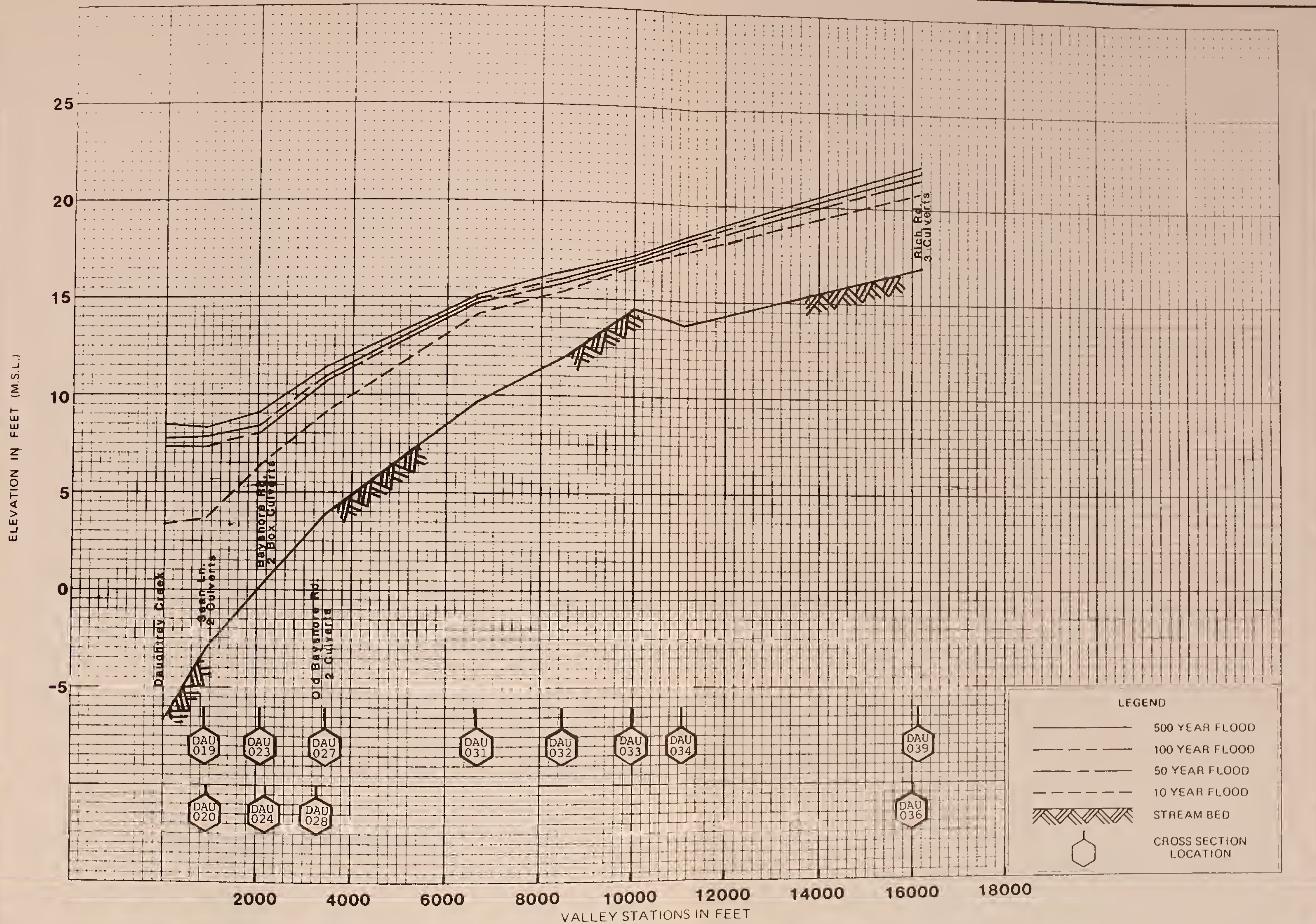
FLOOD PROFILES

DAUGHTREY CREEK TRIB(2)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.28



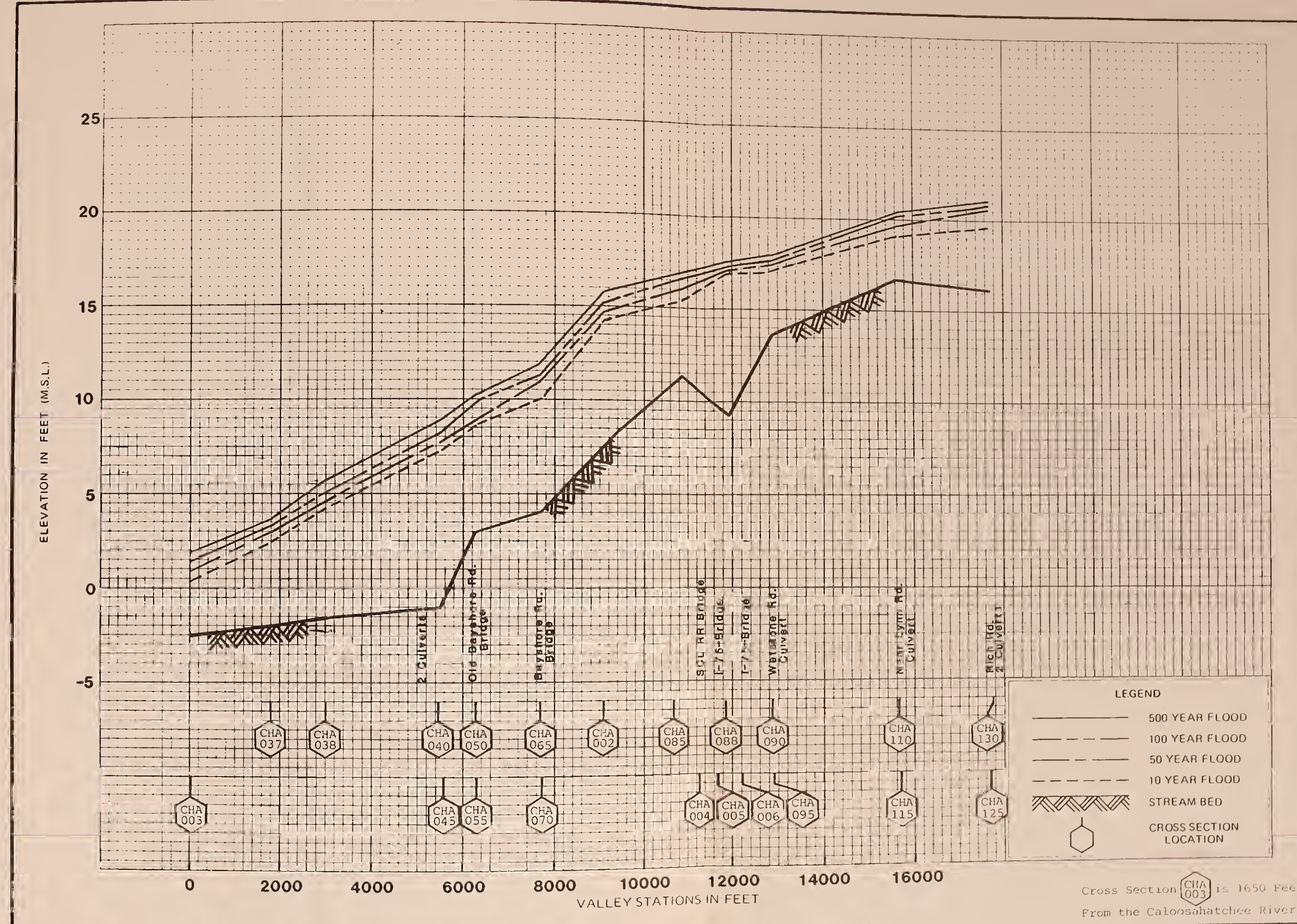
FLOOD PROFILES

DAUGHTREY EAST

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.29



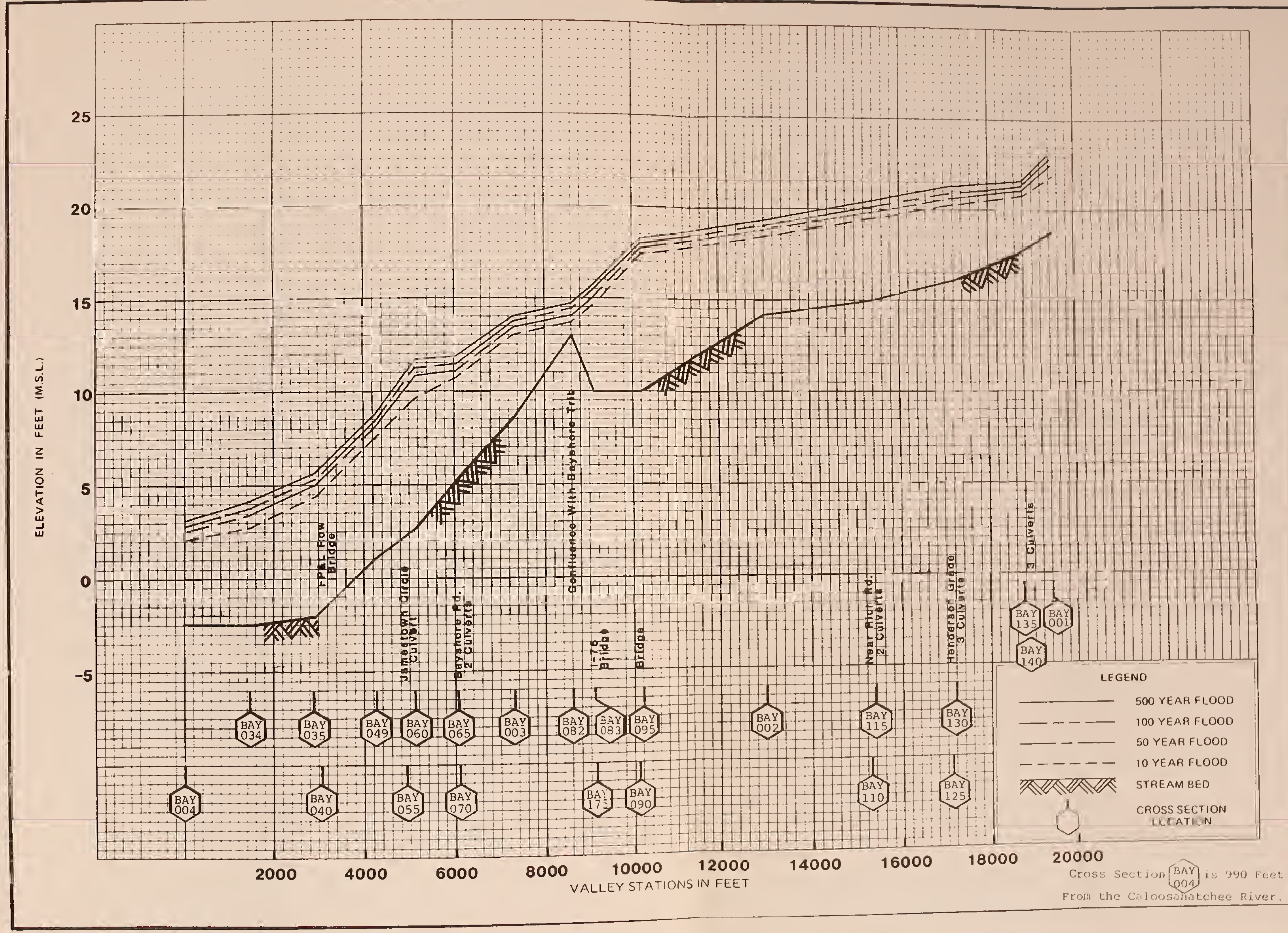
FLOOD PROFILES

CHAPEL BRANCH CREEK

U.S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.30



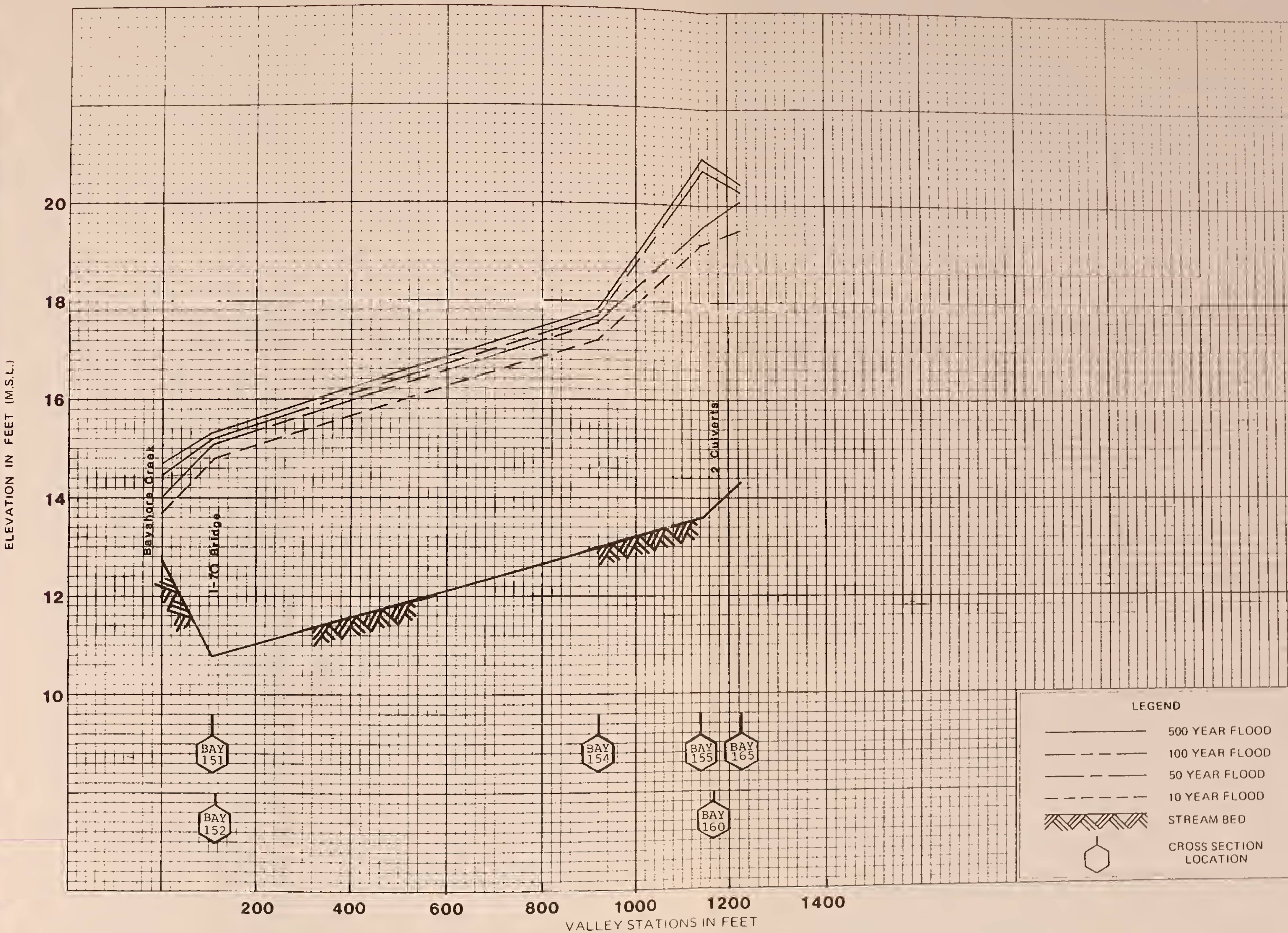
FLOOD PROFILES

BAYSHORE CREEK

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.31



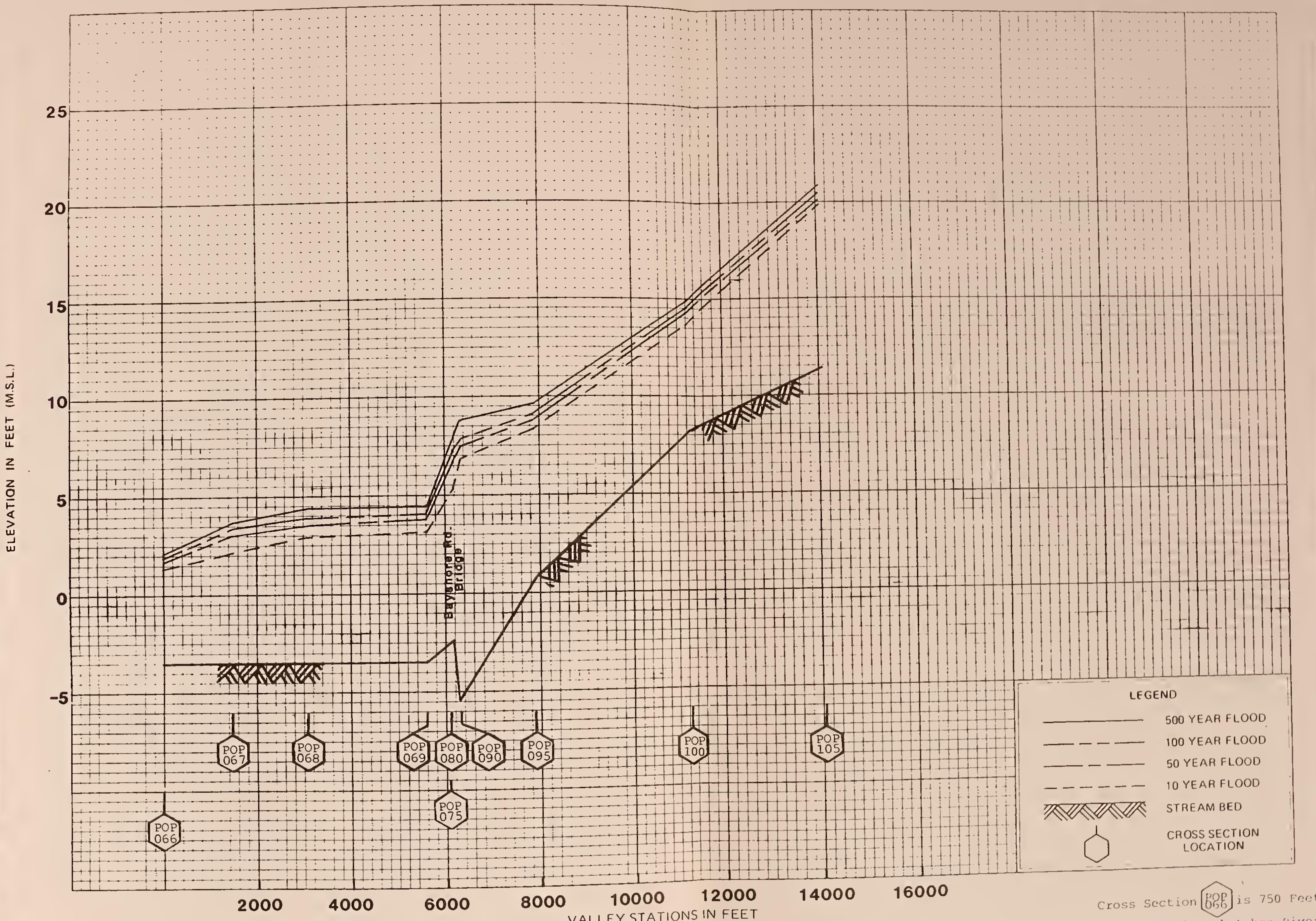
FLOOD PROFILES

BAYSHORE TRIB

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig. 32



Cross Section POP 066 is 750 Feet From The Caloosahatchee River.

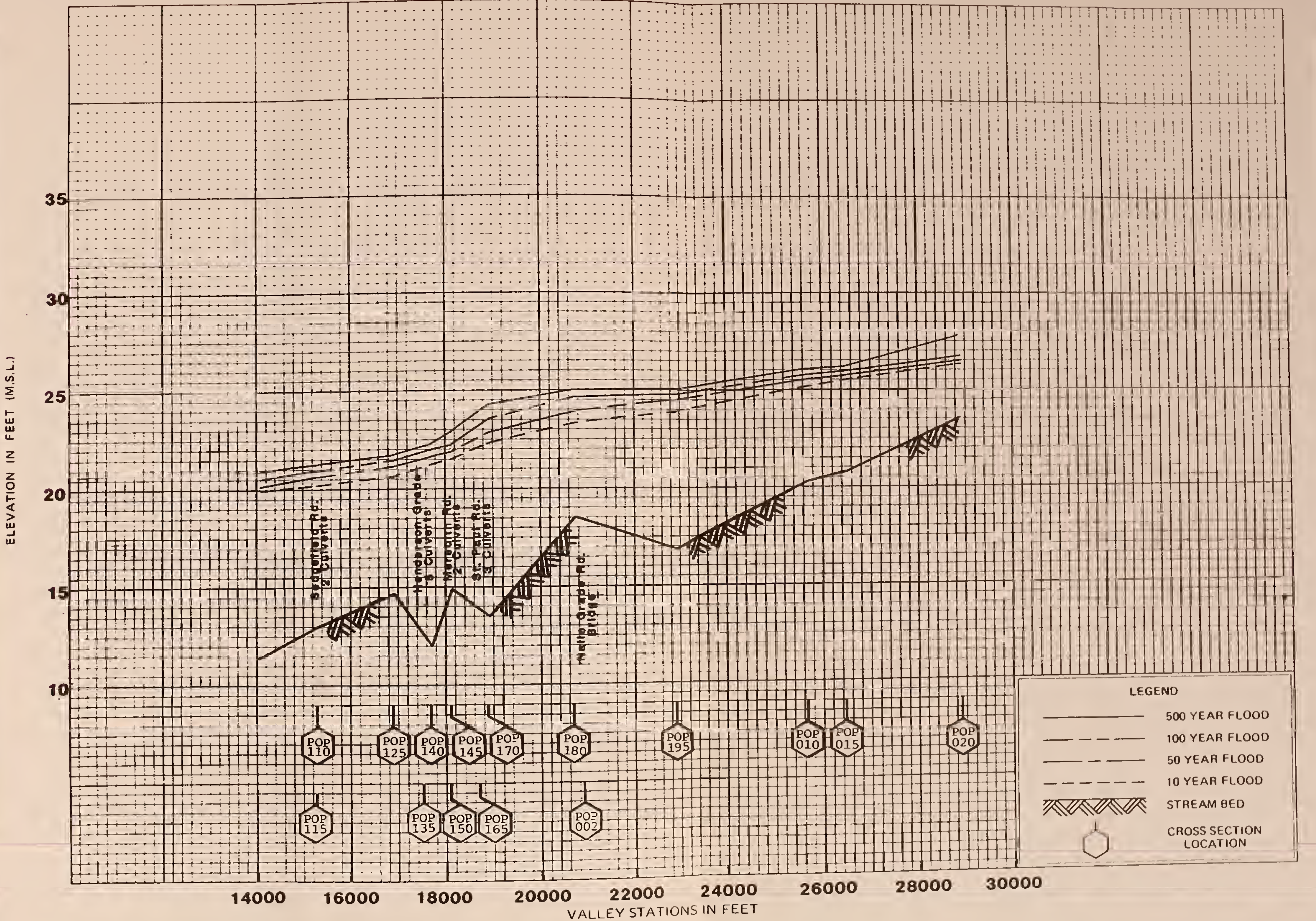
FLOOD PROFILES

POPASH CREEK (LOWER PART)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.33



FLOOD PROFILES

POPASH CREEK (UPPER PART)

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig. 34

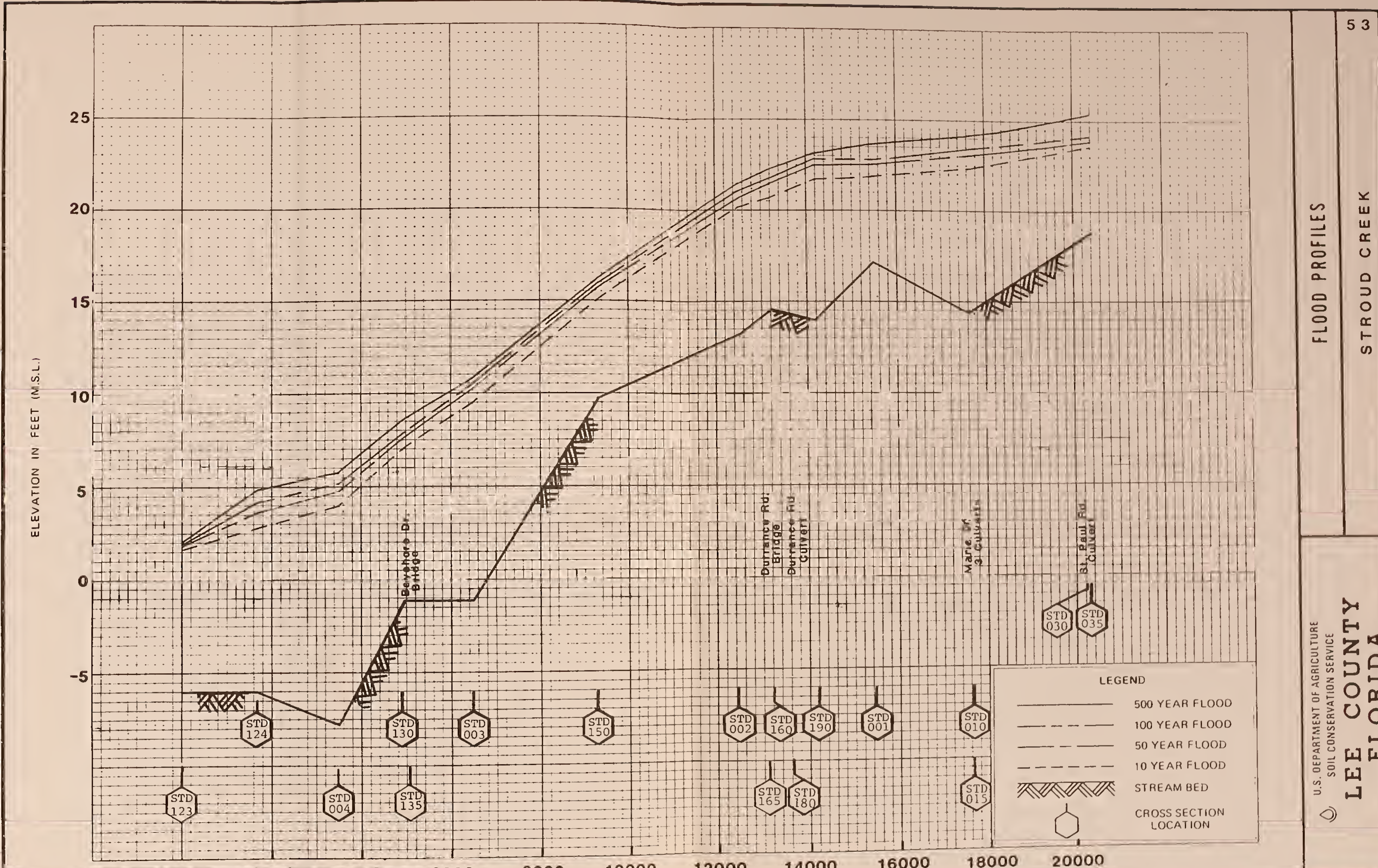
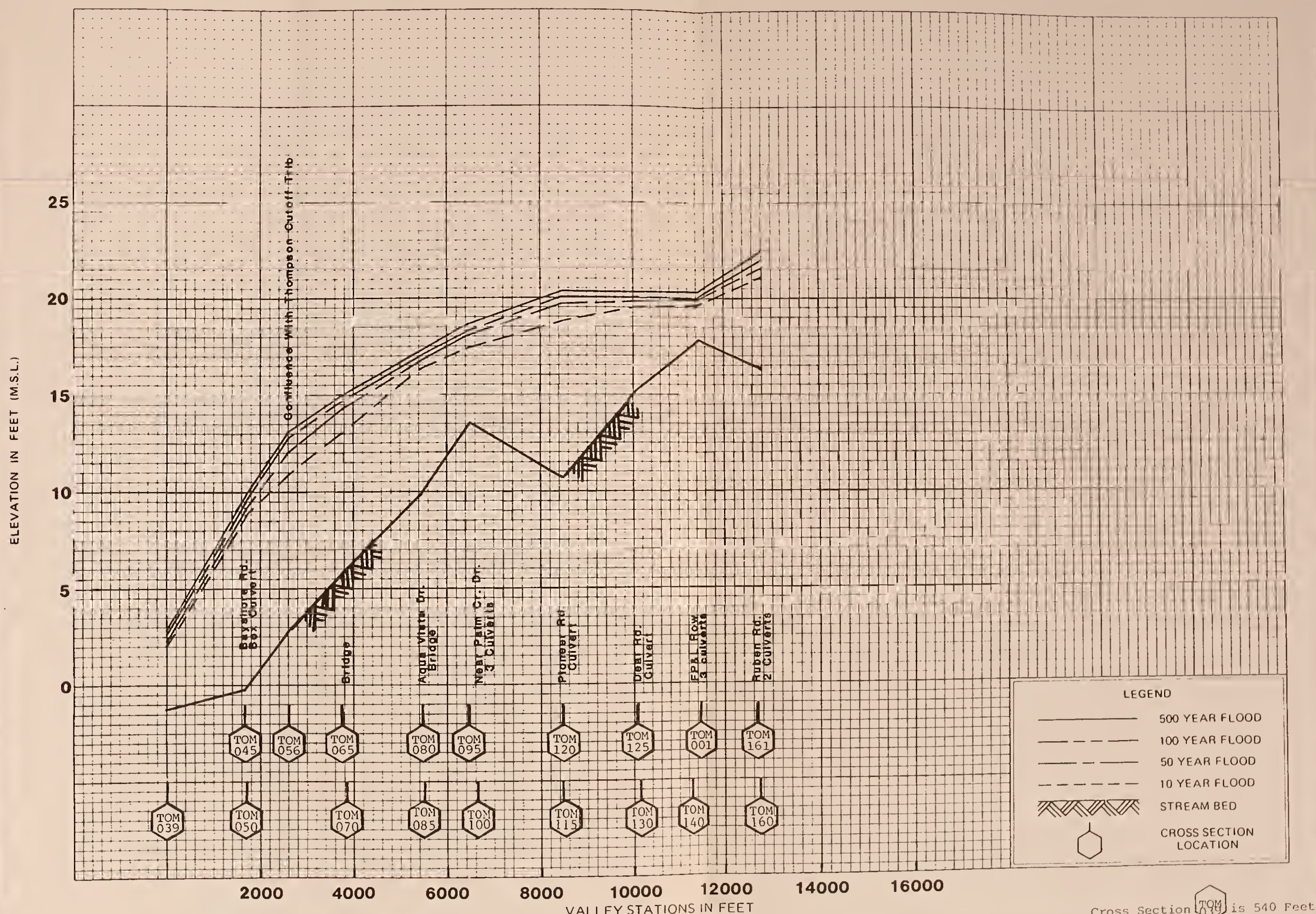

FLOOD PROFILES
STROUD CREEK
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLORIDA
ELEVATION IN FEET (M.S.L.)
VALLEY STATIONS IN FEET
Bayshore Dr. Bridge
Durrance Rd. Bridge
Durrance Rd. Culvert
Marie St. 3 Culverts
St. Paul Rd. Culvert
STD 123
STD 124
STD 004
STD 130
STD 135
STD 003
STD 150
STD 002
STD 160
STD 165
STD 180
STD 190
STD 001
STD 010
STD 015
STD 030
STD 035
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

Fig. 35



Cross Section TOM 039 is 540 Feet From the Caloosahatchee River.

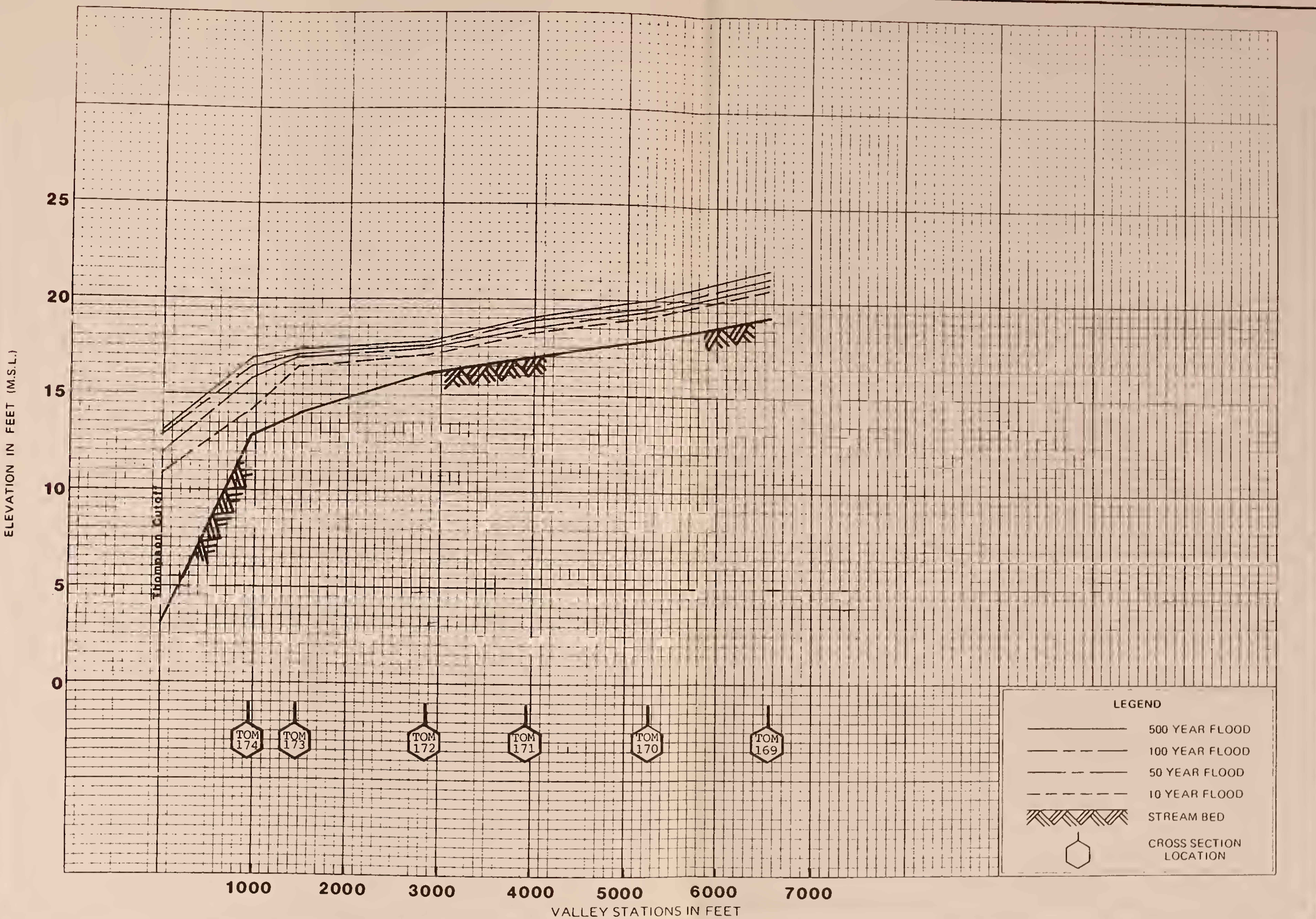
FLOOD PROFILES

THOMPSON CUTOFF

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

Fig.36



FLOOD PROFILES

THOMPSON CUTOFF TRIB

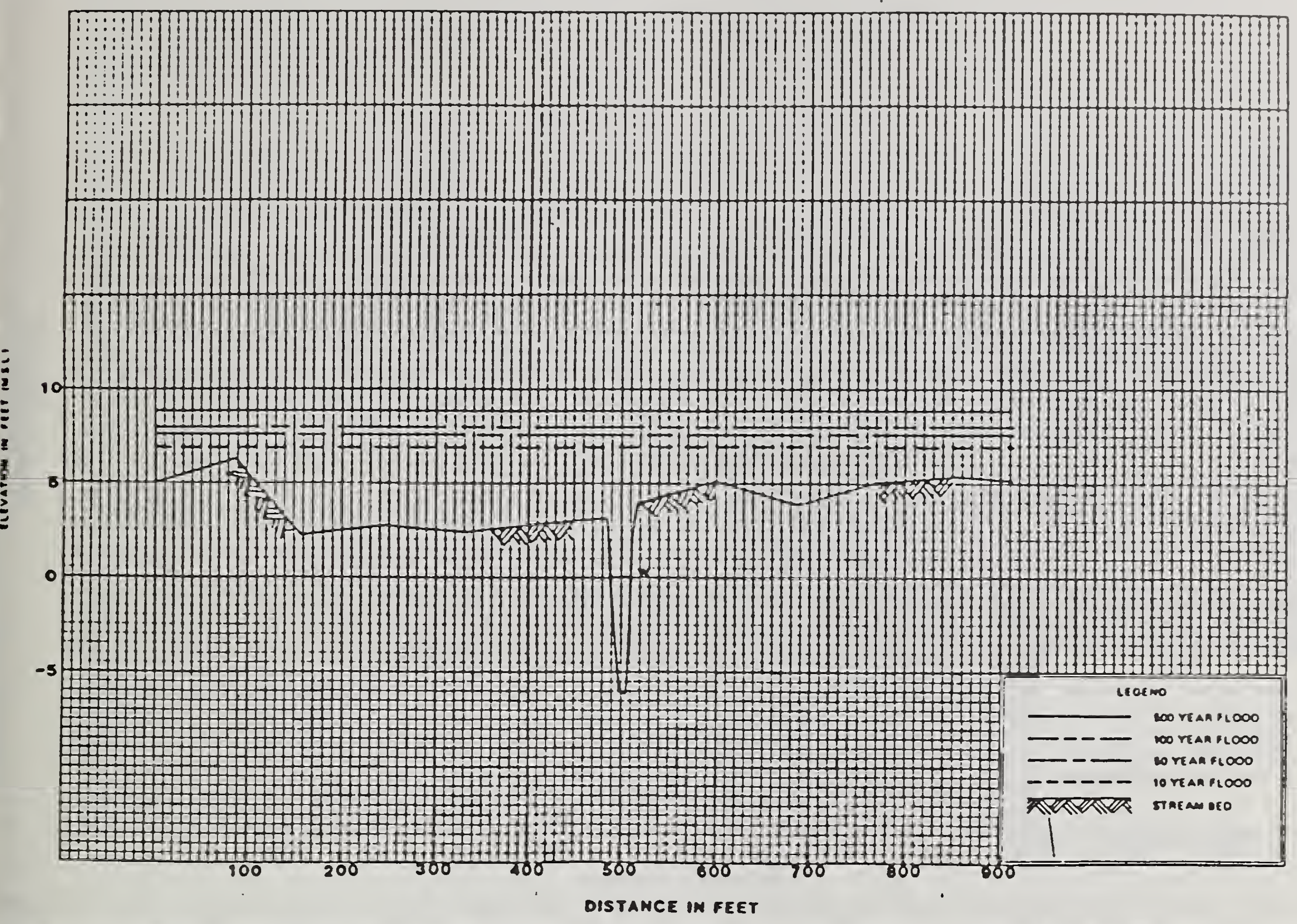
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

LEE COUNTY
FLORIDA

FIG. 37

APPENDIX C

TYPICAL VALLEY CROSS SECTIONS

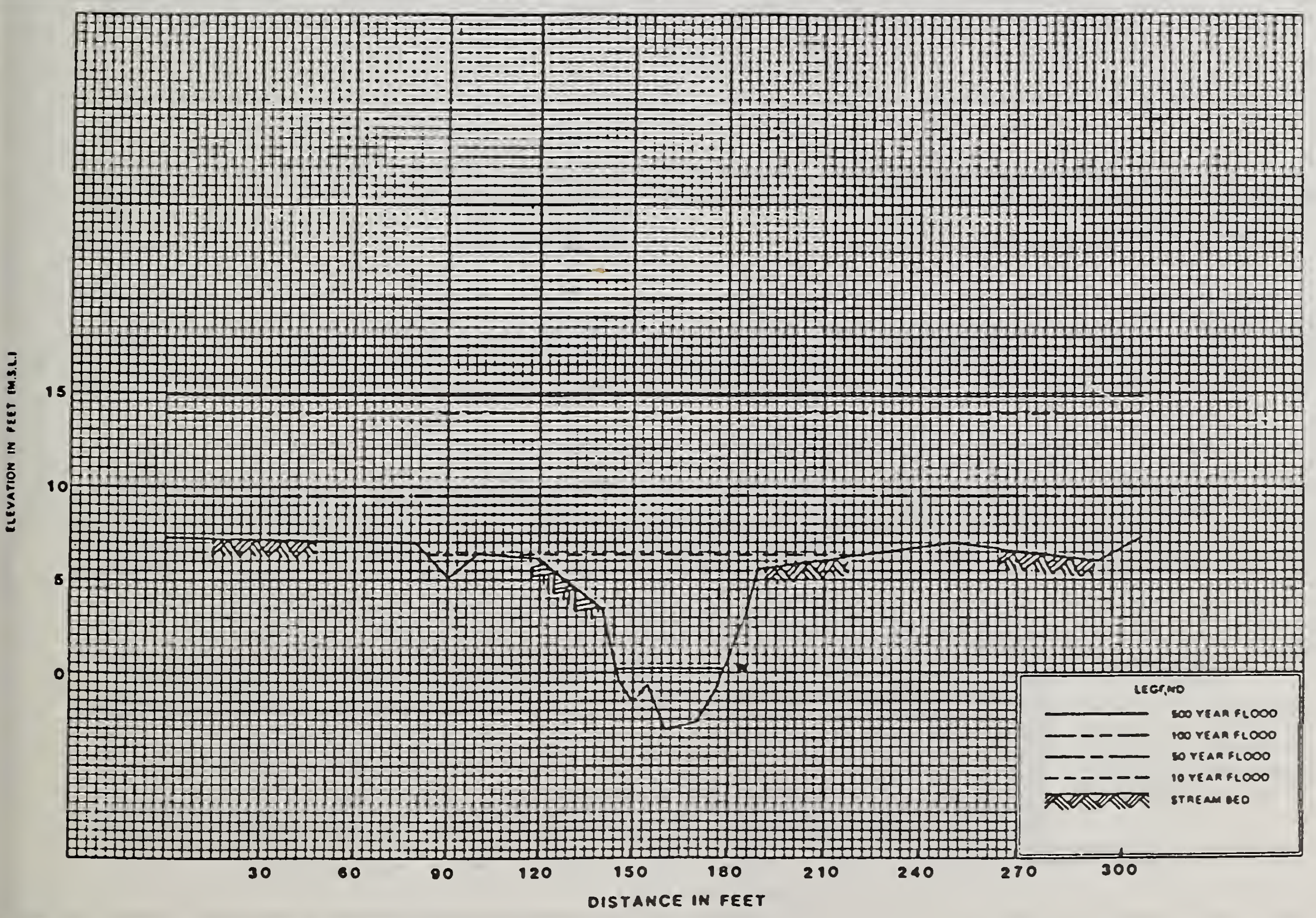


POPASH CREEK

TYPICAL VALLEY CROSS SECTION POP 090

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLORIDA

Fig.38



POWELL CREEK

TYPICAL VALLEY CROSS SECTION POW 033

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLORIDA

Fig.39

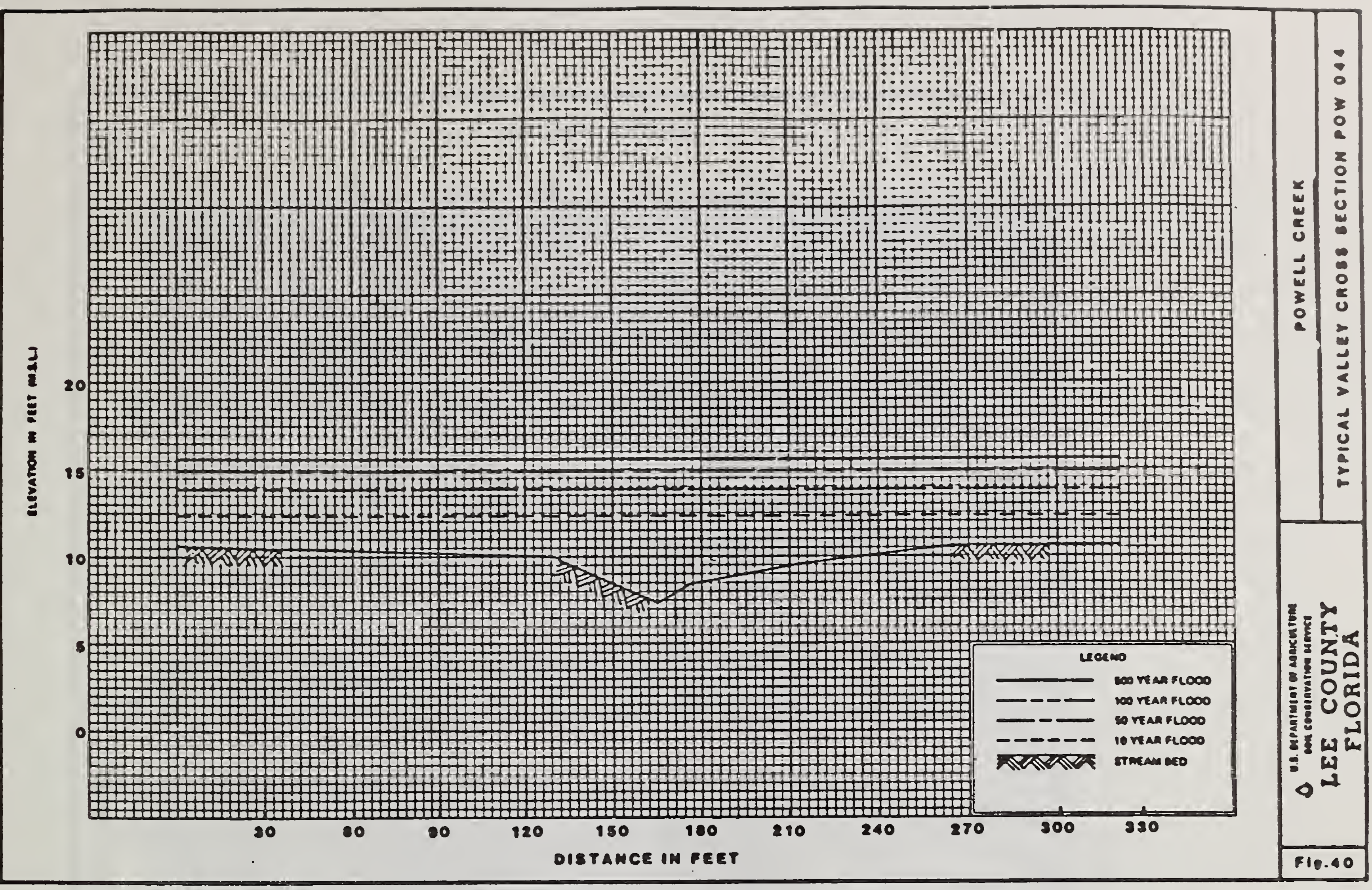

ELEVATION IN FEET (M.S.L.)
20
15
10
5
0
30
60
90
120
150
180
210
240
270
300
330
DISTANCE IN FEET
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
POWELL CREEK
TYPICAL VALLEY CROSS SECTION POW 044
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLORIDA

Fig.40

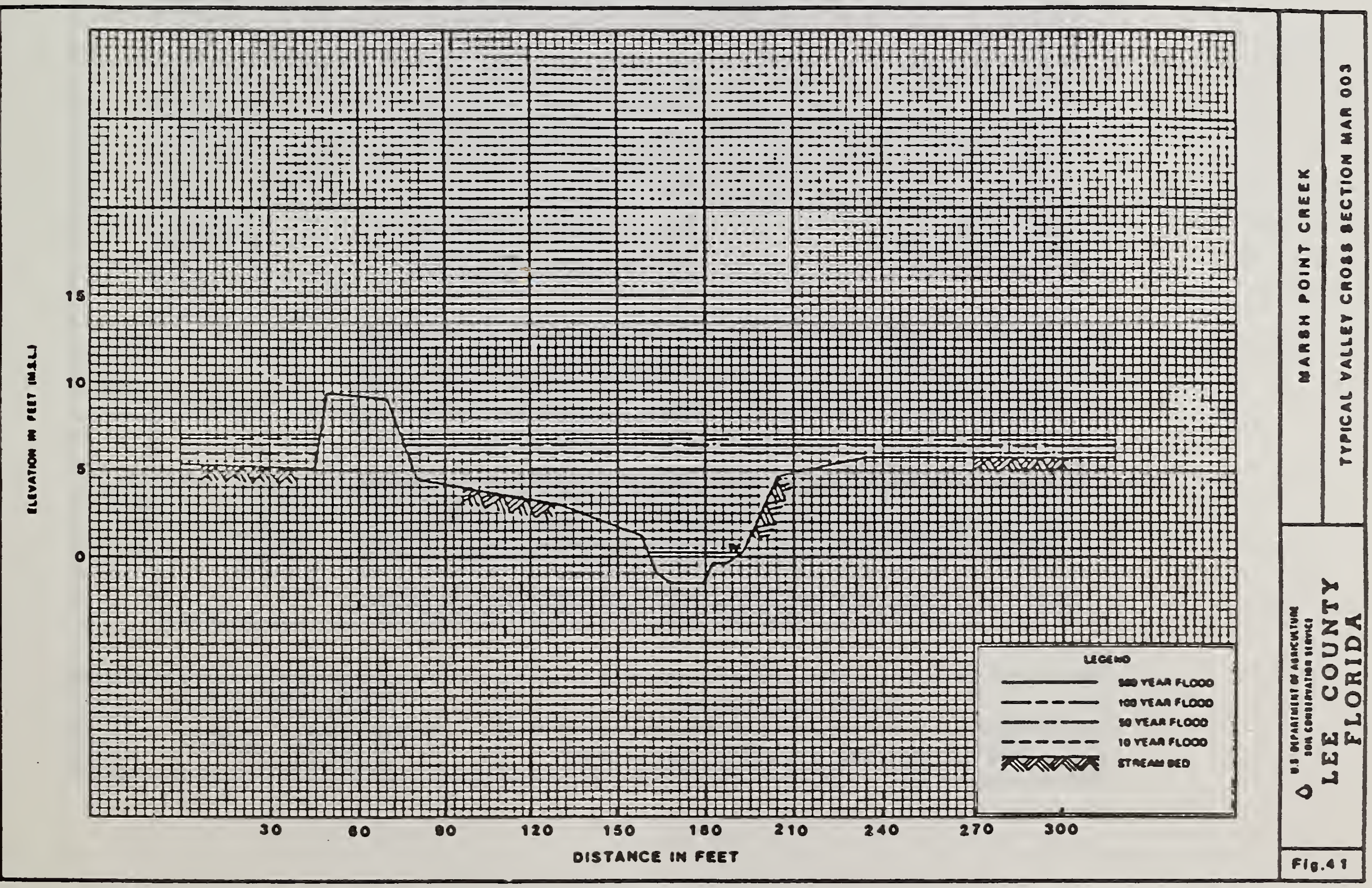

ELEVATION IN FEET (M.S.L.)
15
10
5
0
30
60
90
120
150
180
210
240
270
300
DISTANCE IN FEET
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
MARSH POINT CREEK
TYPICAL VALLEY CROSS SECTION MAR 003
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
LEE COUNTY
FLORIDA

Fig.41

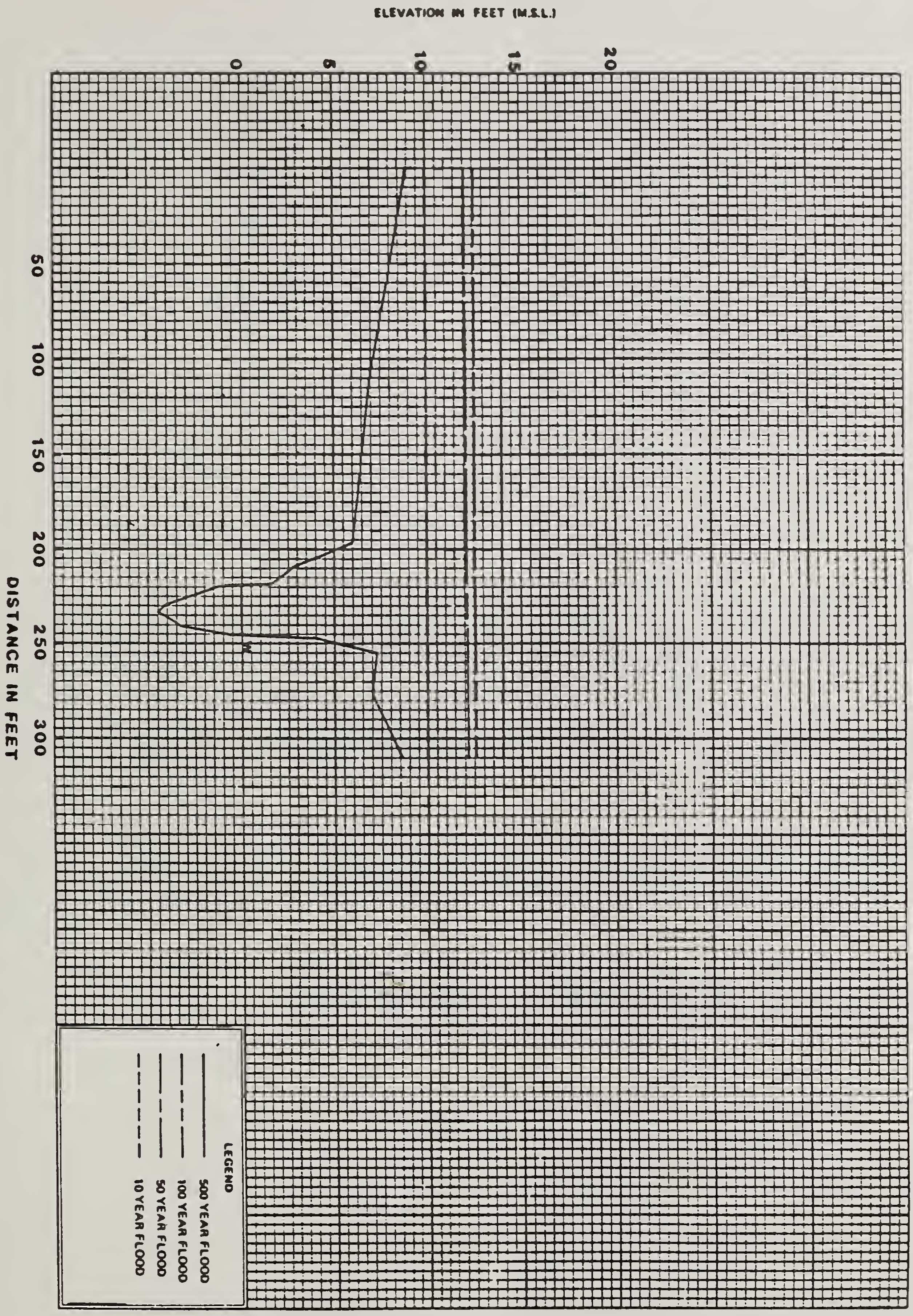


Fig. 42

U.S. DEPARTMENT OF AGRICULTURE
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LEE COUNTY
FLORIDA

DAUGHTREY CREEK

TYPICAL VALLEY CROSS SECTION DAU 060

APPENDIX D

TECHNICAL APPENDIX

INVESTIGATIONS AND ANALYSES

This study was conducted in accordance with a plan of study dated March 19, 1980, by the SCS and local sponsors (see page 1). A review of pertinent literature was made by SCS personnel in order to become as familiar as possible with the complex hydrology of the study area. Bridge, culvert, and cross-section data were obtained by field survey by a private engineering firm under contract with the SCS and was field checked by SCS personnel. Supplemental base field data were obtained in the field by SCS and Lee County employees and estimated by photogrammetric methods. A topographic survey was prepared on a photo base with one foot contour intervals at a scale of 1 inch = 300 feet. This was done under a contract administered by the SCS and paid for by both Lee County and the SCS.

The SCS water surface profile program, WSP-2 (step backwater method), is used to determine water surface elevations for the range of discharge utilizing roughness coefficient data and the field data collected on cross sections, bridges, and culverts. Flood discharges are established by valley flood routings computed through use of the SCS computer program for Project Formulation Hydrology, TR-20. This program uses the modified ATT-KIN method for stream flow and valley flood routing.

On two of the creeks these programs yielded flood discharge rates that appeared excessive. After experimenting with other flood routing models, the USGS Water Resources Investigations 82-42 was chosen for analysis of Powell Creek and Water Resources Investigation 82-4012 was used for Daughtrey Creek.

The 100 year flood plain limits were delineated on the aerial photos with one-foot contour lines (see Appendix A). The width of the flood plain at each cross section was plotted with the area between cross sections interpolated.

Normal bridge flow conditions are assumed in making computations. No consideration is made for openings blocked by debris, flood plain filling or other encroachments which could affect the water surface profile. Computations for this study considered only those features in the flood plain at the time the field surveys were made. Additional watershed and flood plain development and/or stream modifications will require revised water surface profile computations. The methods used to determine the flood elevations are considered accurate within plus or minus 1/2 foot. Due to scale, however, some buildings on raised pads appear to be flooded when in actuality they will probably not.

TABLE 3. DISCHARGE - ELEVATION - FREQUENCY DATA

L-2 (Trib to Yellow Fever Creek)

Cross Section	Station	Drainage Area(Mi2)	Frequency 10-Year Peak Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
L-2090	0	0.36	8.2	122	8.7	179	8.9	200	9.3	252
L-2100	150	0.34	9.6	121	10.8	177	11.2	198	11.7	250
L-2105	575	0.31	10.1	119	11.3	174	11.7	195	12.2	246
L-2115	1037	0.28	10.8	117	12.0	172	12.5	192	13.1	242
L-2125	1499	0.25	11.4	115	12.6	168	13.2	188	13.6	238

TABLE 4. DISCHARGE - ELEVATION - FREQUENCY DATA

L-1 (Trib to Yellow Fever Creek)

Cross Section	Station	Drainage Area (Mi^2)	Frequency 10-Year Peak Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
L-1005	0	0.84	3.0	550	3.9	776	4.2	856	4.7	1056
L-1015	665	0.73	5.1	531	5.8	756	6.1	835	6.5	1035
L-1020	778	0.70	8.3	531	9.6	756	9.9	835	10.6	1035
L-1030	941	0.68	9.9	511	10.5	730	10.7	806	11.0	1001
L-1035	1541	0.68	10.0	511	10.7	730	11.1	806	11.4	1001
L-1045	1641	0.66	10.1	491	10.8	703	11.3	778	11.6	967
L-1050	2241	0.64	10.9	472	11.5	677	11.8	750	12.1	934
L-1060	2341	0.62	11.7	453	12.4	651	12.7	722	13.0	901
L-1065	2841	0.56	12.4	396	12.9	574	13.4	639	13.6	802
L-1075	2941	0.54	12.5	377	13.0	549	13.5	612	13.7	769
L-1080	3741	0.51	13.6	350	14.2	512	14.6	571	14.9	720
L-1086	3841	0.49	14.5	350	15.1	511	15.6	571	15.9	720

TABLE 5. DISCHARGE - ELEVATION - FREQUENCY DATA

Powell Creek (with Suncoast Canal)

Cross Section	Station	Drainage Area (Mi^2)	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
POW030	0	13.03	1.1	1665	1.3	3828	1.4	5247	1.5	7871
POW032	100	12.86	2.3	1643	2.5	3771	2.8	5168	3.1	7752
POW033	2650	9.64	6.4	1217	9.5	2715	13.9	3699	14.9	5549
POW035	2750	9.62	6.7	1215	10.1	2708	14.0	3690	15.0	5535
POW036	4025	9.56	8.8	1207	11.3	2689	14.1	3664	15.1	5496
POW038	4125	9.54	10.2	1204	11.8	2683	14.2	3655	15.1	5483
POW039	6300	9.10	11.8	1146	13.4	2542	14.7	3460	15.2	5190
POW040	6350	9.09	11.9	1145	13.5	2539	14.7	3456	15.3	5184
POW041	6400	9.04	12.1	1138	13.7	2523	14.8	3433	15.5	5150
POW042	7300	9.03	12.3	1137	13.8	2520	14.9	3429	15.6	5144
POW043	7600	1.04	12.3	120	13.8	214	14.9	279	15.6	419
POW044	8425	1.03	12.3	118	13.8	212	14.9	276	15.6	419
POW045	10045	0.93	12.3	106	13.8	188	14.9	245	15.6	368
POW047	10215	0.91	12.5	104	13.9	184	15.0	239	15.6	359
POW048	14040	0.75	13.4	85	14.4	147	15.1	191	15.7	287
POW050	14140	0.73	13.4	83	14.9	143	15.7	185	16.2	278
POW051	16690	0.61	13.5	68	15.5	116	15.9	150	16.5	225
POW053	16790	0.59	14.2	66	15.9	112	16.1	144	16.6	216
POW054	17990	0.48	15.4	53	16.2	88	16.3	113	16.7	170
POW055	20540	0.12	15.4	12	16.2	18	16.4	22	16.8	33

Frequency / Peak

TABLE 6. DISCHARGE - ELEVATION - FREQUENCY DATA

Powell Creek Trib (Old Railroad Grade)

Cross Section	Station	Drainage Area (Mi^2)	Frequency Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
POW020	1170	7.85	14.1	983	15.6	2148	16.4	2915	17.1	4373
POW021	2520	7.72	14.8	966	15.9	2107	16.6	2859	17.2	4289
POW022	5220	7.56	16.7	945	17.5	2058	18.1	2790	18.5	4185
POW023	7920	7.46	16.9	932	17.9	2027	18.4	2748	18.9	4122
POW024	12195	6.46	18.0	803	18.5	1720	18.9	2325	19.4	3488
POW025	16320	3.80	18.9	462	19.2	939	19.5	1256	24.7	1884

TABLE 7. DISCHARGE - ELEVATION - FREQUENCY DATA

Powell Creek Trib (US 41 Canal)

Cross Section	Station	Drainage Area (Mi^2) Peak Frequency	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
POW001	2400	3.12	10.9	376	12.1	750	12.2	999	15.2	1499
POW002	5250	3.05	13.7	367	14.7	731	15.2	973	15.9	1460
POW003	7470	2.86	15.2	344	16.2	679	16.3	903	16.7	1355
POW004	11070	2.78	16.0	334	16.9	657	17.1	874	17.5	1311
POW005	13530	2.31	16.9	275	18.1	532	18.3	705	18.7	1058
POW006	17730	2.13	17.6	253	18.3	485	18.6	642	18.9	963
POW007	20580	1.59	18.4	186	18.7	347	19.0	457	19.4	686
POW008	23760	1.40	18.9	163	19.3	300	19.3	394	19.8	591

TABLE 8. DISCHARGE - ELEVATION - FREQUENCY DATA

Marsh Point Creek

Cross Section	Station	Drainage Area (Mi^2)	Frequency 10-Year Peak Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
MAR050	1	2.4	1.9	1196	2.2	1583	2.3	2196	2.4	2342
MAR003	2730	1.34	5.9	858	6.5	1133	6.6	1147	6.7	1411
MAR140	2855	1.32	7.3	753	10.5	994	10.6	1007	10.7	1238
MAR145	4680	1.20	9.4	456	11.4	602	11.5	610	11.6	750
MAR151	4780	1.18	9.4	436	11.4	576	11.5	583	11.6	717
MAR002	5830	1.16	9.4	415	11.4	549	11.5	556	11.6	683
MAR160	7705	0.95	9.4	299	11.4	395	11.5	400	11.6	492
MAR165	9080	0.83	11.0	228	11.5	302	11.6	306	12.0	376
MAR175	9180	0.81	11.0	216	11.6	989	11.7	290	12.1	356
MAR180	11160	0.44	11.1	59	11.7	79	11.8	80	12.2	98
MAR185	13090	0.26	12.3	35	12.7	47	12.7	48	13.2	59
MAR195	13190	0.24	14.1	34	14.5	45	14.6	46	15.0	56
MAR100	15780	0.07	16.1	33	16.3	44	16.4	44	16.5	55
MAR001	15880	0.05	16.4	32	16.5	43	16.6	44	16.9	53

TABLE 9. DISCHARGE - ELEVATION - FREQUENCY DATA

Marsh Point Trib

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak	10-Year		50-Year		100-Year		500-Year	
				Elevation: MSL-Ft.	Discharge CFS	Elevation: MSL-Ft.	Discharge CFS	Elevation: MSL-Ft.	Discharge CFS	Elevation: MSL-Ft	Discharge CFS
MAR010	22500	0.11		4.9	1366	5.1	1973	5.3	2196	5.4	2751
MAR011	22600	0.10		6.0	247	6.4	358	6.7	399	6.9	500

TABLE 10. DISCHARGE - ELEVATION - FREQUENCY DATA
Marsh Point East

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
MAR021	2835	0.49	6.7	391	6.9	578	7.0	647	7.1	819
MAR025	3885	0.46	6.8	58	7.0	85	7.1	95	7.2	119

TABLE 11. DISCHARGE - ELEVATION - FREQUENCY DATA

Daughtrey Creek

Cross Section	Station	Drainage Area (Mi^2)	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
DAU004	0	38.67	0.3	2389	0.8	4148	1.0	5039	1.3	7288
DAU037	690	38.61	0.4	2386	1.1	4143	1.4	5034	1.9	7280
DAU038	1390	38.46	0.6	2379	1.7	4132	2.1	5021	3.0	7261
DAU040	2140	38.44	1.5	2379	3.3	4131	4.1	5019	5.4	7259
DAU047	3490	38.31	3.0	2373	7.1	4121	7.5	5007	8.1	7242
DAU050	7090	35.18	7.5	2234	9.6	3886	10.1	4723	10.9	6841
DAU060	7170	35.01	10.0	2229	12.1	3878	12.6	4712	14.0	6820
DAU065	8540	34.98	10.6	2225	12.1	3871	12.6	4705	14.0	6815
DAU003	11170	34.41	12.7	2199	14.6	3827	15.2	4652	16.0	6741
DAU076	11940	34.35	13.2	2196	15.0	3822	15.6	4647	16.5	6733
DAU080	12890	33.42	14.4	2154	16.2	3751	16.7	4560	17.7	6611
DAU085	14390	33.36	15.9	2151	17.5	3746	18.0	4554	19.0	6603
DAU095	14490	33.30	16.4	2150	17.7	3744	18.1	4550	19.2	6599
DAU100	16270	33.27	18.0	2147	19.0	3739	19.5	4546	20.5	6591
DAU110	16850	33.03	19.0	2136	20.1	3720	20.4	4524	21.3	6559
DAU002	19160	32.86	19.8	2129	20.9	3707	21.3	4508	22.3	6737
DAU116	20430	32.78	20.1	2125	21.3	3701	21.7	4500	22.8	6526
DAU120	21710	32.72	21.4	2122	22.6	3696	23.0	4494	23.9	6518
DAU121	21890	32.69	22.1	2121	23.1	3694	23.3	4492	24.1	6514
DAU122	22090	32.65	22.1	2119	23.1	3691	23.3	4488	24.1	6509
DAU125	23070	32.26	22.6	2101	24.9	3660	25.2	4451	25.5	6457
DAU140	26710	32.01	24.2	2089	25.3	3641	25.6	4427	26.1	6423
DAU155	27350	31.84	25.4	2082	26.0	3627	26.3	4411	26.7	6400
DAU166	28335	31.68	25.7	2074	26.5	3615	26.8	4396	27.4	6379
DAU170	29685	28.79	26.2	1938	27.1	3384	27.5	4117	28.3	5984
DAU001	32285	28.42	26.5	1921	27.5	3354	27.9	4081	28.7	5933

TABLE 12. DISCHARGE - ELEVATION - FREQUENCY DATA

Daughtrey Creek Trib (1)

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
DAU011	1230	0.83	13.4	157	15.2	292	15.7	362	16.6	560
DAU012	2280	0.80	13.5	153	15.3	285	15.8	353	16.7	546
DAU014	2400	0.78	13.6	150	15.7	280	16.5	347	17.1	537

TABLE 13. DISCHARGE - ELEVATION - FREQUENCY DATA

Daughtrey Creek Trib (2)

Cross Section	Station	Drainage	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
DAU016	570	0.42	11.0	97	13.0	183	13.6	227	14.3	355
DAU017	1770	0.25	11.2	67	13.2	127	13.8	159	14.4	251

TABLE 14. DISCHARGE - ELEVATION - FREQUENCY DATA

Daughtrey Creek Trib (Daughtrey East)

Cross Section	Station	Drainage Area (Mi^2)	Peak Frequency: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
DAU019	600	3.13	3.7	402	7.3	732	7.7	900	8.3	1359
DAU023	1775	2.98	6.4	389	8.0	707	8.4	870	9.1	1315
DAU027	3125	2.80	9.1	372	10.7	677	10.9	834	11.4	1261
DAU031	6325	2.66	14.1	359	14.7	654	14.8	805	15.0	1219
DAU032	8200	2.42	15.4	335	15.8	612	16.0	755	16.3	1144
DAU033	9700	2.10	16.7	303	16.9	555	17.0	685	17.2	1041
DAU034	10795	2.07	17.5	300	17.9	550	18.0	678	18.2	1031
DAU035	15745	1.37	20.9	224	21.5	413	21.9	511	22.3	782

TABLE 15. DISCHARGE - ELEVATION - FREQUENCY DATA

Chapel Branch

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
CHA037	1800	2.09	2.5	956	3.0	1396	3.2	1546	3.6	1934
CHA038	3000	2.05	4.3	956	4.8	1394	5.1	1544	5.6	1928
CHA040	5450	1.95	7.3	957	7.7	1389	8.3	1537	8.9	1914
CHA046	5530	1.95	8.5	957	8.8	1389	9.9	1537	10.0	1914
CHA050	6230	1.89	8.6	957	8.9	1385	10.0	1533	10.0	1905
CHA060	6330	1.89	10.1	957	10.8	1385	11.0	1533	11.6	1905
CHA065	7680	1.65	10.1	956	11.0	1371	11.2	1515	11.9	1867
CHA075	7760	1.65	12.5	956	13.2	1371	13.8	1515	14.2	1867
CHA002	9260	1.52	14.3	855	14.6	1223	15.2	1350	15.8	1662
CHA081	9700	1.50	15.1	843	15.5	1201	16.2	1325	16.4	1631
CHA085	10870	1.30	15.5	693	16.1	984	16.8	1083	17.0	1333
CHA086	11320	1.28	16.5	678	16.9	963	17.1	1059	17.2	1304
CHA087	11600	1.23	16.9	642	17.1	911	17.2	1002	17.3	1232
CHA088	11910	1.18	17.0	607	17.2	860	17.3	945	14.7	1162
CHA089	12250	1.18	17.1	607	17.3	860	17.5	945	17.6	1162
CHA090	12860	1.11	17.2	558	17.5	790	17.6	867	17.7	1066
CHA100	12940	1.11	18.4	558	18.4	790	18.7	867	19.4	1066
CHA001	15040	.68	19.2	467	19.5	677	20.0	753	20.1	943
CHA110	15620	.65	19.4	460	19.8	668	20.2	743	20.3	932
CHA116	15660	.65	19.5	460	20.1	668	20.3	743	20.5	932
CHA117	16360	.62	19.6	452	20.3	658	20.5	733	20.7	921
CHA120	17690	.58	19.7	441	20.5	644	20.7	719	20.8	906
CHA130	17750	.58	19.9	441	20.7	644	20.8	719	20.9	906

TABLE 16. DISCHARGE - ELEVATION - FREQUENCY DATA

Bayshore Creek

Cross Section	Station	Drainage Area (Mi^2) / Frequency / Peak	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
BAY004	0	2.59	2.0	742	2.4	1126	2.6	1252	2.9	1526
BAY034	1560	2.52	2.6	742	3.4	1125	3.7	1251	4.1	1525
BAY035	2940	2.45	4.4	738	5.0	1112	5.2	1234	5.4	1488
BAY045	3040	2.45	6.3	738	6.7	1112	6.9	1234	7.0	1488
BAY049	4330	2.34	7.5	734	8.1	1098	8.3	1214	8.5	1446
BAY050	5110	2.30	9.5	733	10.4	1092	10.9	1206	11.3	1431
BAY060	5160	2.30	9.6	733	10.9	1092	11.1	1206	11.5	1431
BAY065	6060	2.28	10.9	732	11.2	1089	11.4	1202	11.6	1423
BAY075	6110	2.28	12.1	732	12.4	1089	12.6	1202	12.7	1423
BAY003	7340	2.11	13.1	723	13.4	1066	13.6	1198	13.7	1412
BAY081	7970	1.96	13.3	723	13.6	1066	13.7	1198	13.8	1412
BAY082	8610	1.93	13.7	719	14.0	1042	14.1	1164	14.2	1403
BAY083	9110	1.86	14.7	719	15.0	1042	15.1	1164	15.2	1403
BAY084	9190	1.86	15.6	719	15.8	1042	15.9	1164	16.0	1403
BAY085	10120	1.84	16.5	707	16.7	1025	16.8	1136	16.9	1398
BAY095	10220	1.84	17.6	707	17.8	1025	17.9	1136	18.0	1398
BAY002	13100	1.67	18.6	694	18.8	997	18.9	1112	19.0	1380
BAY101	14000	1.62	19.0	671	19.2	966	19.3	1078	19.4	1373
BAY105	15350	1.42	19.4	581	19.6	842	19.7	940	19.8	1197
BAY115	15410	1.42	19.7	581	19.9	842	20.0	940	20.1	1197
BAY120	17210	1.26	20.2	510	20.3	743	20.4	831	20.5	1056
BAY130	17260	1.26	20.5	510	20.7	743	20.8	831	20.9	1056
BAY135	18790	1.06	21.0	421	21.2	621	21.3	695	22.0	882
BAY145	18850	1.06	21.6	421	21.8	621	21.9	695	22.0	882
BAY001	19540	.99	22.4	391	22.7	578	22.9	647	23.0	821

TABLE 17. DISCHARGE - ELEVATION - FREQUENCY DATA

Bayshore Trib

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
BAY151	105	0.08	14.8	87	15.1	139	15.2	155	15.3	195
BAY153	175	0.08	16.0	66	16.5	96	16.6	106	16.7	134
BAY154	915	0.03	17.2	66	17.6	95	17.7	106	17.8	133
BAY155	1145	0.03	19.2	64	19.5	93	20.5	104	20.9	131
BAY165	1205	0.03	19.5	64	20.1	93	20.3	103	20.5	130

TABLE 18. DISCHARGE - ELEVATION - FREQUENCY DATA

Popash Creek

Cross Section	Station	Drainage Area (Mi^2)	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
POP066	0	8.55	1.4	1585	1.6	2450	1.6	2792	1.7	3643
POP067	1450	8.29	2.3	1495	3.1	2264	3.4	2568	3.6	3324
POP068	3100	8.19	3.0	1461	3.6	2195	3.8	2485	4.3	3206
POP069	5600	7.94	3.2	1378	3.7	2028	3.9	2285	4.3	2924
POP070	6000	7.94	4.8	1378	5.7	2028	5.9	2285	6.1	2924
POP080	6160	7.94	5.4	1378	6.9	2027	7.2	2285	7.9	2924
POP090	6290	7.94	6.7	1378	7.5	2027	7.9	2285	8.7	2923
POP095	7890	7.63	8.2	1291	8.7	1893	9.0	2129	9.6	2715
POP100	11340	6.75	13.7	1056	14.4	1532	14.5	1713	14.8	2160
POP105	14140	6.23	19.8	787	20.1	1157	20.3	1294	20.9	1623
POP110	15240	6.19	20.3	769	20.6	1132	20.8	1265	21.4	1586
POP120	15320	6.19	20.4	769	20.7	1132	20.9	1265	21.5	1586
POP125	16870	6.07	20.6	755	21.2	1057	21.4	1181	21.8	1479
POP130	17520	5.99	20.9	755	21.5	1057	21.7	1181	22.1	1479
POP140	17600	5.99	21.3	755	21.7	1056	21.9	1181	22.3	1479
POP145	18080	5.59	21.5	754	21.9	1055	22.2	1181	22.9	1479
POP155	18170	5.59	21.7	754	22.1	1055	22.7	1181	23.2	1478
POP160	18740	5.37	22.2	753	22.6	1055	23.1	1181	23.6	1478
POP170	18820	5.37	22.3	752	22.9	1054	23.5	1181	24.1	1478
POP175	20140	5.22	22.8	739	23.4	1054	24.0	1181	24.7	1478
POP180	20700	5.19	23.3	729	23.9	1054	24.6	1181	24.8	1478
POP195	22980	5.01	23.9	720	24.5	1053	24.7	1181	25.0	1478
POP005	23080	5.01	24.2	720	24.8	1053	24.9	1180	25.3	1478
POP010	25630	4.59	25.1	706	25.5	1038	25.6	1164	25.9	1464
POP015	26430	4.59	25.6	706	25.6	1038	25.7	1164	26.3	1464
POP016	27980	4.30	26.1	697	26.3	1027	26.4	1152	27.7	1454
POP020	28980	3.88	26.3	696	26.5	1019	26.6	1147	27.8	1443

TABLE 19. DISCHARGE - ELEVATION - FREQUENCY DATA

Stroud Creek

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
STD123	0	7.90	1.6	1487	1.7	2187	1.8	2449	1.9	3106
STD124	1630	7.85	2.8	1471	3.6	2163	4.1	2423	4.9	3072
STD004	3580	7.79	4.0	1347	4.8	1937	5.1	2157	5.7	2724
STD130	4940	7.67	7.0	1321	7.6	1908	7.9	2126	8.6	2685
STD140	5090	7.67	7.5	1321	8.3	1907	8.5	2125	8.7	2685
STD003	6440	7.41	9.5	1265	10.3	1843	10.5	2057	10.9	2599
STD150	9240	7.19	15.0	1219	15.6	1788	15.8	2000	16.2	2526
STD151	11160	7.04	17.2	1215	17.8	1784	18.0	1995	18.4	2523
STD002	12590	6.81	20.1	1209	20.7	1778	21.1	1989	21.5	2517
STD160	13160	6.80	20.7	1209	21.5	1777	21.8	1989	22.3	2517
STD170	13220	6.80	20.9	1209	21.7	1777	21.9	1989	22.5	2517
STD175	13640	6.79	21.1	1209	21.9	1777	22.1	1988	22.7	2516
STD185	13690	6.79	21.4	1209	22.1	1777	22.4	1988	22.9	2516
STD190	14260	6.52	21.8	1202	22.5	1769	22.7	1980	23.2	2509
STD001	15580	6.44	22.0	1199	22.7	1767	22.9	1978	23.6	2507
STD009	17260	6.27	22.2	1186	23.0	1745	23.1	1954	23.9	2478
STD010	17660	6.27	22.4	1183	23.2	1740	23.4	1949	24.2	2471
STD015	17685	2.7	22.4	1179	23.2	1733	23.5	1941	24.3	2462
STD020	17710	6.27	22.5	1174	23.3	1727	23.6	1934	24.5	2453
STD021	18310	6.27	22.8	1154	23.4	1697	23.6	1901	24.5	2410
STD025	20210	5.92	23.1	927	23.5	1363	23.7	1527	24.6	1936
STD035	20270	5.92	23.6	924	24.0	1359	24.3	1522	25.4	1930
STD036	21590	2.77	24.3	916	25.3	1347	25.6	1509	26.6	1913

TABLE 20. DISCHARGE - ELEVATION - FREQUENCY DATA

Thompson Cutoff

Cross Section	Station	Drainage Area (Mi^2)	10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
TOM039	0	2.66	2.0	1593	2.23	2347	2.3	2625	2.6	3312
TOM003	300	2.63	2.2	1593	2.8	2347	3.0	2625	3.2	3312
TOM045	1650	2.56	8.8	1515	9.2	2245	9.4	2511	9.6	3170
TOM055	1750	2.56	10.0	1515	10.4	2245	10.6	2511	10.8	3170
TOM056	2620	2.01	10.9	961	12.0	1503	12.8	1687	13.0	2140
TOM002	3250	1.57	12.8	604	14.6	998	14.6	1124	14.8	1432
TOM065	3800	1.55	13.1	589	14.4	977	14.7	1101	15.0	1403
TOM075	3870	1.55	14.2	589	15.9	977	16.4	1101	16.8	1403
TOM080	5520	1.49	16.4	547	16.9	915	17.0	1032	17.1	1316
TOM090	5580	1.49	17.1	547	17.9	915	18.1	1032	18.3	1316
TOM095	6540	1.44	17.5	513	18.2	865	18.3	975	18.6	1245
TOM105	6580	1.44	17.5	513	18.2	865	18.3	975	18.6	1246
TOM110	8470	1.33	18.8	442	19.8	758	20.1	856	20.2	1094
TOM120	8530	1.33	18.8	442	19.8	758	20.1	856	20.2	1094
TOM125	10090	1.25	19.6	393	20.1	684	20.1	773	20.2	989
TOM135	10170	1.25	19.6	393	20.1	684	20.1	773	20.2	989
TOM136	10420	1.04	19.7	278	20.1	504	20.1	571	20.2	733
TOM145	10490	1.04	19.7	278	20.1	504	20.1	571	20.2	733
TOM001	11530	0.91	19.8	216	20.1	404	20.1	459	20.2	590
TOM155	12740	0.80	20.3	205	20.5	373	20.5	423	20.5	543
TOM161	12850	0.80	21.1	205	21.6	373	21.9	423	22.5	543
TOM165	16120	0.25	23.8	124	24.5	182	24.9	203	25.0	257

TABLE 21. DISCHARGE - ELEVATION - FREQUENCY DATA

Thompson Cutoff Trib

Cross Section	Station	Drainage Area (Mi^2)	Frequency / Peak: 10-Year Elevation: MSL-Ft.	10-Year Discharge CFS	50-Year Elevation: MSL-Ft.	50-Year Discharge CFS	100-Year Elevation: MSL-Ft.	100-Year Discharge CFS	500-Year Elevation: MSL-Ft	500-Year Discharge CFS
TOM174	960	0.39	14.2	102	15.7	180	16.4	225	16.8	350
TOM173	1470	0.37	16.4	99	16.9	151	17.1	179	17.3	200
TOM172	2880	0.33	17.1	85	17.4	141	17.6	172	17.7	276
TOM171	3950	0.29	18.2	71	18.5	131	18.8	164	19.0	254
TOM170	5265	0.21	19.1	63	19.4	123	19.6	155	20.0	245
TOM169	6575	0.07	20.6	32	20.9	46	21.3	52	21.7	65